THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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STANDARDISATION RULES.

THERE is a community of interests of manufacturers and users in the electrical industry, as in all other industries, and any standardisation rules for electrical machinery can, therefore, scarcely be considered as entirely satisfactory unless they are the result of what has been so well termed sympathetic co-operation between the purchaser and the producer. Such being the case, the rules provisionally adopted by the British Electrical and Allied Manufacturers' Association, published in this issue, and which represent much strenuous labour on the part of the Committee of the Association appointed for that purpose, can only be regarded as an expression of the reasoned views of the manufacturers on this subject of deep interest to us all. Doubtless the rules will be most useful in preparing tenders, and they should, moreover, prove of material assistance to the Engineering Standards Committee in the revision of their Report No. 36, Standards for Electrical Machinery, now out of date. As the B.E.A.M.A. is officially represented on the Standards Committee, it is just a question as to whether the possibility of confusion which may arise from the issue of the rules, at the present juncture, might not have been entirely obviated if a few words by way of explanation had been added to the somewhat enigmatical preface. The economic advantages of standardisation have become increasingly recognised of late years, more especially in this country, but it would be a little unfortunate if every Association were to issue a set of rules on its own account.

At the same time, competition both at home and from abroad, makes it most desirable not only that the cost of production should be reduced, but that a uniform and satisfactory basis of rating electrical machinery should once and for all be established, with no more delay than is necessary for all parties concerned to be duly consulted.

The I.E.C. has recently brought together many eminent electrical engineers of various countries, our own included, who are discussing this very subject, and if they succeed in arriving at a satisfactory solution, as we sincerely hope they will, much simplification in commercial transactions will result, with consequent benefit to both home and foreign trade. Our esteemed contemporary, the *New York Electrical World*, in its issue of May 10th, calls attention to the revised rules of the Verband Deutscher Elektrotechniker, remarking that the German rules give evidence of considerable progress over the superseded rules, and of the increasing possibility of being able to look forward to the time when one set of standardisation rules for electrical machinery will be recognised universally. There appears, in fact, to be a very general desire on the part of the Standardising Committees of the different countries to do their best to bring their national rules into line, as far as possible, with the suggestions put forward by the I.E.C. The present views of the British manufacturers, however, as expressed in these provisional rules, appear to differ considerably from the inter-

national proposals in such fundamental points as the limits of temperature permitted and the method of measuring them. This question of permissible temperature is so intimately connected with that of the method of rating, to say nothing of the influence of the time element in regard to the capabilities of a machine, and the method suggested by the makers for dealing with this subject is so complicated, that considerable enlightenment and simplification will be necessary if the recommendations are to find acceptance with consulting engineers and users generally.

The unsatisfactory and incomplete character of the report on British Standards for Electrical Machinery has been drawn attention to on more than one occasion, but it should be remembered that the B.E.A.M.A. was not in existence when the subject of the report was under consideration. Now, however, the problem is, happily, much simplified, and although many divergent interests may still exist and necessitate a certain amount of compromise in order to be reconciled, we are sure that, with the present rules of the Association as a basis, the issue may safely be left in the hands of the Engineering Standards Committee to be dealt with in a thoroughly impartial and satisfactory manner.

CHINA.

The smashing of idols in ancient temples, the lopping off of pigtails—a Manchu heritage, and therefore to be banned—and the encouragement of a wiry crop in place thereof, an appeal to the nations of Christendom for prayer, and the conclusion of negotiations for a 25 million loan! Here we have indications of the astounding changes that are taking place in parts of the great Chinese Empire. They almost take our breath away with their suddenness. The new sentiment may not be unanimous, and there may be many troublesome days in store—has not Sun Yat Sen very grave suspicions as to the purposes upon which Yuan Shih-k'ai and his satellites intend to spend those Christian millions when they get them?—yet they are the outward expression of a very deep-rooted and wide-spread desire to throw off the yoke and get into line with other nations. The educated minds of China have not lived in the States and among Western nations, nor observed the progress of Japan, without learning how far behind they are, considered from the point of view of civilisation. How well the lesson has been learned is observed in the thoroughness with which it has been disseminated far and wide promoting the desire to move forward. We have mentioned the throwing off of the yoke, but the bit and bridle of reactionary forces and of internal jealousies, rivalries and strife will prevent the leap forward being too hasty. Japan may to-day be engaged in thorny controversy with the States respecting the ownership of Californian land by Japs, but China, at any rate, is not quite yet in a position to frighten Europe with its Yellow Peril fear. For the present, yes, and for a long time to come it will be the case, China will need our help. We are going to send it in part in the form of millions of money, but we have got to do it in other ways too. We heard of an enterprising little American, who, on finding his way into one of the old musty temples last year or the year before, pulled himself up to his full height, waved his hand round toward the 500 idols and remarked to an English missionary present:—"*We're* going to clear out the whole bally lot of 'em!" Well, there is nothing like being ambitious when there is opportunity, and while we, of course, wish well to any such movement, we are here more immediately concerned with the necessity for the British manufacturer saying with an equally determined, but, perhaps, more diplomatic air: "*We* are hoping to bring our things into China, so that the people of this vast Empire may, with the aid of British manufactures, take fuller advantage of the enormous resources that await development." We do not doubt that the money now asked for will be found, and we should like an assurance that a fair proportion of it will be spent with us again; but that is not the British method, and so we have got to scramble with the other manufacturing and exporting nations of the world, initiative, enterprise, quality, and so forth all entering into the game. We are not going to win our way in China all at once, nor are any of our competitors. They have a great reverence for the past in that country, and their estimation of the value of time is altogether different from ours, so that it will be long before they adopt our old saw about "Procrastination," or the slogan, "Do it now!" They are not going to be driven by anybody, and this, to our mind, is one of the redeeming features of the situation considered from the British trade standpoint.

But it would be a suicidal policy for the British trader to fall into line with the Chinese and say, "any time will do." If they are not in a hurry, and have no respect for undue haste, the truth remains that the awakening that has been proceeding, has created a need, which is fully recognised by the many thousands of modernised minds, for facilities characteristic of civilised countries, and those who are at hand, ready and willing to supply that need, will stand to gain.

They must have railways, and they talk of the construction of 60,000 miles in a record time, seemingly belying in this their reputation for slowness, and, if their dreams or anything like them are carried into effect, "foreigners," be they British, American, or German, will all be required to co-operate, and industrial nations may look for busy times, for only a small proportion of the equipment can, so far, be provided from within. This slowness characteristic, after all, has to be considered in a comparative sense. Where population is counted by hundreds of millions, and a few millions more or less killed in the course of a revolution are of little account, and Chinese life is so prodigal that little store is set by it, what would it trouble the Empire, if it had the money, to put a million or so labourers to work on railway construction? The individual rate of working may not compare with ours, but in the bulk the pace would be rapid. When they have determined that the correct time and opportunity have arrived for moving, there will be no mistaking the movement. What will follow railways is a big subject, and we have ventured to indicate it in the merest outline in these pages on several occasions. What is a railway for but to promote movement of people and of goods? Give China ready money enough to keep the peace and to construct railways and telegraphs, and she will herself go a long way toward the development of her resources; the cultivation of all sorts of trade and traffic will lead to the release of wealth, and the progress of civilisation will encourage her people to take enlightened views as to industry and industrial occupations, and forces now dormant will reach unparalleled proportions. But in and through all of this, it is imperatively necessary that British prestige be kept well to the fore, that respect for British firms and British manufactures be strengthened, that the leading men, both in and out of Government circles, be inspired with the fullest confidence in us, that the creation of German and American sympathies be not permitted without some counter-influence being strongly at work from British authorities, Governmental, financial and trading.

When competitors rub shoulders in entering the "Open Door" to a ripening harvest field, a modern equipment and a diplomatic but determined carriage and gait will do more for British industry than a Ruth-like gleaning after the labourers of Boaz have gathered in the bulk of the crops.

We have frequently referred to what has been done at Hong Kong University in the hope of building up British engineering reputation at that important centre of Chinese

educational influence and of distribution, and we mention the matter again on another page to-day—we hope the latest appeal may not pass unheeded by our electrical manufacturers. We have also referred to the promotion of the British Engineers' Association and its activities, and we wish this organisation every success. But it can only rise to the occasion with fullest efficiency if the present propaganda work among firms in the provinces lead to a large increase in its membership. It asks for the co-operation of the entire British engineering industry, which will mean that it will have a commensurate financial backing, without which it cannot efficiently cope with so vast and difficult a field any more than the Chinese can pay debts, keep the peace, or build railways without loans. Meetings have lately been held at Sheffield and at Manchester, at which the objects of the Association have been well stated, and a number of additional firms have joined. We propose to revert to the arguments used in a later issue. Meantime, we can only imagine that it is because our people have not yet fully grasped that in China there is what may prove to be "the biggest market the world has ever known"—to use the words of Captain FitzHugh, the Association's Commissioner in China—that they have not more readily accepted the invitations to co-operate with an organisation which aims in various ways at strengthening the British trade position there.

60,000 Employés; Profit on Sales, £1,630,000 per annum.

During the past few months we have had through our hands the annual reports of many of our electric manufacturing companies, and though here and there we have, with disappointment, read of unsatisfactory results, these have been exceptional, and due to labour troubles. In the majority of cases there was plenty of work to do, and better profits were earned, while the outlook suggests a continuation of satisfactory manufacturing activity for, at any rate, some time to come. But in all these doings we are only able to think in tens or hundreds of thousands, and the reader may be pardoned if he feels that he has been entertained with comparatively small affairs when he contemplates the gigantic proportions of the business conducted by some of the Continental and American industrial electrical trust organisations whose operations and results we record from time to time. The position in this country is very different from that obtaining in the United States, with its vast territory and larger population, and all that those two things mean, and with its fiscal policy—now undergoing a change—that we do not, of course, refer to the results secured by a Brobdignagian American concern as in any way indicating what ought to have occurred in the British Isles with their naturally more limited home demand. We give the information that follows rather as a matter of interest showing the success of our American cousins in their own sphere, while it may also be suggestive of what *may* happen in the course of years in Canada—whence our own and other people are flocking in their hundreds of thousands. The General Electric Co., of Schenectady, and other centres in the United States has, of course, a hold on many interests, and it has grown remarkably, in spite of its early tribulations, as anybody who has watched its progress for 20 years and more, as we have done, will have noticed. It has, apparently, quite outgrown its difficulties, and being very strong financially, as well as very active in certain foreign markets, nothing seems now to be able to hinder its progressive course.

Twenty years ago, the company's plants stood at well under £800,000 value in the books. During the intervening period, £11,600,000 has been expended for such purposes, and £7,470,000 has been written off, leaving the book value of the plants at December last at £4,911,000.

The past year's outlay on patents and patent matters was £108,000, and this has been charged to profit and loss, leaving the patent account standing at one solitary dollar. What a deep sigh reaches us from much nearer home!

The number of employés in factories, offices, and subsidiary companies is now in excess of 60,000, and excluding three departments dealing in lamps, there were 466,895 orders handled in the year 1912.

Presumably, the holders of stock to-day are reaping the benefit of the company's financial measures in early years, for last October there was a stock dividend of 30 per cent. paid out of surplus, "for the purpose of recouping the stockholders in part for dividends passed or reduced during the years 1893 to 1902." This distribution was in addition to the 8 per cent. dividend for the year. The total stock issued now stands at just over £20,000,000.

The figures relating to the year's operations are remarkable, but it may be mentioned that the businesses of the Fort Wayne Electric Works, the Sprague Electric Co., and the National Electric Lamp Co. are now merged into the G.E. Co., and their transactions appear in the report for the first time. These circumstances also account for the increase in the factory floor area from 8½ to 12 million square feet in two years. The value of orders received during 1912 was £20,600,000, and the "amount of sales billed" was £14,000,000. Profit on sales was £1,630,000, with £1,000,000 income from other sources. After the reduction of interest, &c., and dividends paid, there was available to carry to the surplus account for the year a very respectable sum, *i.e.*, £1,280,000. As the surplus previously stood at close upon £6,000,000, this item, after paying the special stock dividend, which absorbed between £4,000,000 and £5,000,000, still figures at £2,400,000.

Notwithstanding the above magnificent showing, President Coffin remarks that competition has continued to increase in severity during the year, "with the result that the percentage of profit realised from the sales of apparatus has materially diminished."

One passingly wonders who are the courageous competitors who can compel so big a concern to lower its prices. Clearly, in the States as in Germany, the building up of huge concerns does not stifle the undercutter nor do away with smaller enterprises when there is a large field. Still, we would not grumble at competition if we could make 8 per cent. per annum and a supplementary stock bonus of 30 per cent.

This excursion among American millions is useful by way of a change, and we must console ourselves with the less imposing figures characteristic of our large number of smaller, though not necessarily, on that ground, less satisfactory, manufacturing concerns.

We believe that there may be a better chance for British electrical manufactures even in the States before long. Some say that the chance now is better than we know. It would be interesting to see some States' selling prices placed in parallel columns against those of as nearly as possible similar British articles.

It may not have pleased some people to see the order for the Victorian railway electrification train equipments go out of this country; but then we may set off against this the ordering here of big turbo-generator sets for service in the States. "Exchange is no robbery."

The General Electric Co., of America, not only manufactures on a colossal scale, but it has stocks and bonds in other undertakings to the tune of close upon £5,000,000, and it is not difficult to see that these undertakings, in addition to yielding a fine return by way of dividends, also bring much business to the Schenectady and other factories. The same sort of thing has also been observed in Germany, but who will use the word success in regard to our largest efforts of a somewhat similar kind in the United Kingdom? Perhaps, however, we may take courage from the memory that even Schenectady had its nine lean years (1893 to 1902) and hope to think our profit in millions in future years. A point that must not escape us, however, is that those "lean" years in the States were our "fat" years, for we were then busy with new tramways and electricity works. On the other hand, our electrical industry 15 or 20 years ago really *was*, in a comparative sense, in its infancy. To-day we are told that it has a capital of 500 millions invested in it, and remembering that fact we are humiliated to have to continue to ask for £100 six times over for the Electrical Trades Benevolent Fund.

REVIEWS.

The Law of Electric Lighting, Power and Traction. By the late John Shiress Will, K.C. Fourth Edition by W. E. Tyldesley-Jones, Barrister-at-Law. London: Butterworth & Co. Price 27s. 6d.

To adapt an old simile to modern requirements, a large number of kilowatts have passed through the cables since the third edition of the late Judge Wills's book made its appearance. It may be said of the fourth edition, for which Mr. Tyldesley-Jones is responsible, that under his capable editorship the book has grown in wisdom. If it has grown as much in wisdom as it has grown in weight, it will be of enormously added value to the profession.

That the law relating to electricity is fully deserving the serious attention of commentators will be appreciated when one remembers the advances recently made in the application of electricity to the varied needs of a prosperous nation. During the period which has elapsed since the last edition of this work these developments have been very remarkable. As Mr. Jones points out in the preface, the capital involved in electric supply and electric traction undertakings has now assumed enormous proportions. Local authorities in London and the provinces have been authorised to raise loans amounting in the aggregate to £45,704,059 for the purpose of such undertakings, and to borrow £45,903,038 for electric traction, whilst the total capital of electric supply companies exceeds £52,532,000, and of electric traction companies £165,546,000.

During the same period of 10 years important developments have taken place in the law regulating the supply and use of electricity. The Electric Lighting Act, 1909, has been passed, giving effect to many of the recommendations made by the Joint Committee presided over by Viscount Cross in 1898, and enacting, with regard to all electric supply undertakings, provisions which had previously been frequently inserted in the special Acts of particular undertakers.

It is to Mr. Jones's treatment of this new measure that one naturally turns in order to estimate his work at its true value, in view of the fact that his comments must in the nature of things be wholly independent of the views of any of the former editors of the work.

We may say at once that the notes to the various sections of this Act are admirably clear and concise, and are well calculated to aid the non-legal reader to understand its provisions with considerable ease.

The contents of the work may be thus briefly described. An introduction deals in a descriptive form with the Electric Lighting Acts as a whole; licences; provisional orders; electric supply undertakings in the County of London; Power Acts, and Factory Acts. The body of the work contains the statutes in force relating to electricity, with numerous notes and comments; a suitable form of provisional order, power Bill, &c., and rules and regulations, forms of account, &c.

A most useful feature of the work is to be found at pp. 309-313, where the Editor has set forth certain special clauses which are sometimes inserted in a provisional order or confirming Act. These are collected from various provisional orders now in force. What is known as the Bermondsey clause—providing for revision of prices so as to balance revenue and expenditure—is here set out at length. Another most useful form is the Somerset and District Electric Power Act, 1903.

An exhaustive index completes a work which, in its new form, can be heartily commended to the notice of the electrical and legal professions.

Der Elektrizitätszähler Seine Wirkungsweise, Konstruction und Praktische Handhabung. By R. Ziegenberg. Berlin: Hermann Meusser. Price 10 M.

This book gives a comprehensive view of present day electricity supply meter practice and is evidently the work of an expert who is able to lay stress on the essential differences between the numerous types, instead of merely collecting a series of uncritical descriptions.

The whole ground, including the important question of cost, is covered, but, owing to the moderate dimensions of the book, a good deal of compression has been found necessary. The information given, however, is sufficient for readers having some practical experience of meters.

The first two chapters deal with electrical measurements generally and with direct-reading ampere, volt and watt meters. The remaining six chapters are devoted to electricity supply meters proper, and deal, respectively, with (1) the various principles available for electrical energy measurements; (2) detailed descriptions of the more important modern meters for D.C. and A.C. work; (3) special tariffs and the meters used with them; (4) the manufacture, testing and checking of meters; (5) legal regulations in Germany affecting the use and maintenance of meters; and finally (6) practical points affecting the installation and reliability of meters, with a useful table giving the most common faults to which meters are liable and the methods of curing them.

The book should be a useful one both for students and those in charge of meters.

Foundations and Machinery Fixing. By F. H. Davies. London: Constable & Co., Ltd. 1912. Price 2s. net.

In these days when the fixing of engines is thrown, by some firms, upon the responsible shoulders of a bricklayer's labourer, a book on machinery fixing should attract attraction. Fixing machine foundations to-day is done by the aid of a spirit level, a few wedges and a lot of slushy grout. The more elderly of us were brought up to fix metal upon solid stone. Foundation plates were rubbed to and fro on the stone surface, tested by level, the blackened rubbed stone dressed down at the higher ends, or corners, the bedplates again let down and rubbed and levelled, and the stone dressed again and again until at last the plate was level all ways, and the stone was pretty well iron-blacked all over. Concrete and cement have simplified and cheapened the art—perhaps improved the job—but is it quite fair that engine builders, because cement is used, should decline their fixing responsibilities as they do to-day? The author of the book before us is of the new school, and says that stone scarcely merits consideration, and he is quite right to-day, for heavy Ashlar masonry has gone out of use, and it is better to devote space to concrete and its mixing, and to grout and the manner of its putting in.

The author begins with actual construction of foundations. It would be interesting just now to know what is the pressure per square foot of the foundations of St. Paul's dome.

Is it the 3 to 4 tons here tabulated for gravel, or the 4 tons for London clay? St. Paul's has stood for 250 years, and these more heavily loaded parts have sunk, possibly, 4 or 6 in. more than adjacent parts with consequent shear through vaultings. After all, it is not so much the pressure per square foot which matters, as the equality of pressure on every pier, and the avoidance of lateral escape of compressed material. Sand, held in, cannot be crushed, but a sand foundation can be wrecked by a child.

Foundations weigh, we are told, from one and a half to five times the weight of the machine they carry. Such extremes as this, derived from actual practice, are, if good samples in the cases they are drawn from, only a proof that the design of foundations cannot be taught, but must be the result of experience and engineering intuition. Actual examples are given in tables which, however, say nothing of the earth beneath the foundation. There are no fewer than 13 such tables of steam and gas and oil engine foundations.

The author speaks up for sharp sand as opposed to sand much water-worn. Opinion to-day is, however, much less inimical to water-worn sand. It has often the merit of being much cleaner than pit sand, and is usually sound stuff to which good fine-ground cement flour will adhere firmly. The rule for cement mixture is deficient.

The water to fill up a given measure full of the heavy aggregate is the measure of the sand to be used, and the water necessary to fill up a measure of dry sand is the minimum volume of cement to be used with that sand, and this volume should be increased at least 10 per cent.

It may be true that sand is not essential to the making of concrete and that it is only employed to save cement. But the

same could be said of the broken stone—the aggregate generally. A foundation might be made entirely of cement, but the cost would be greater. Actually the aim is to use so much cement that every bit of stone or sand shall be separated from any other bit by a thin wash of cement. The best concrete would be that made by tumbling the heavy aggregate with cement sufficient to dust it all over, doing the same with the dry sand and all the rest of the cement; then tumbling the whole, slowly adding the necessary water. Hand-mixing rarely extends to more than three turns over dry followed by other turns over with water in some bulk—a mistake. Concrete should be machine mixed, water being added in fine spray. Really well-mixed concrete may be merely damp enough to flush up wet on the surface when rammed.

In brick-built foundations it does not really matter that the cement joints should be as thin as $\frac{1}{4}$ in. It is probable that with a well-wetted brick that will not perish the cement mortar, a half-inch joint is better, for it is a good brick that will not fail sooner than the cement joint. A brick-in-cement wall is monolithic if properly built, and the grouting not skimped, and a half-inch joint will better let in the grout than a thinner space.

Nor in hoop iron bonding does it now seem necessary to tar and sand the hooping. If free from grease the plain iron, if rusted to a clean surface free from scale, will stick to, and be protected by, cement mortar. On the subject of vibration, the author shows his hand in favour of allowing a moving machine to move with its foundation under vibratory influences. And why not? Mount an engine on a foundation with a spherical base and keep the block free laterally, and there would be no transmitted vibration. But could the block be prevented from walking away? Probably a layer of thick felt would admit of the equivalent effect of a spherical base surface and also provide against walking off. If a thing is vibrating, it is at least useless to try to stop it by lateral struts. A foundation on cannon balls will prevent lateral transmission of vibration, but the to-and-fro pitching which sets up pumping in a wet soil can only be met by allowing the whole mass to rock. Pure up-and-down movement of vibration cannot, however, be countered unless by a sufficient interposed elasticity of springs, cork, felt, or other agent. This is quite a good book.

Wireless Telegraphy. By H. T. DAVIDGE. London: Percival Marshall & Co. Price 6d. net.

The series of booklets to which the present volume belongs has already established a high reputation which should be further raised by Mr. Davidge's work. The author succeeds in presenting a simple and accurate explanation of the fundamental features and methods of wireless telegraphy while adhering to scientifically and technically correct terms. The preliminary chapter follows the usual lines of reviewing earlier systems of wireless communication, enumerating certain of the properties of ether as utilised in wireless telegraphy, and stating the relationship between velocity, frequency and wave length; the chapter closes with an account of the chief properties of Hertzian waves.

Chapter II deals with Essential Apparatus, and describes the construction and applications of condensers in conjunction with inductance coils; the calculation of the natural frequency of an oscillating circuit (pure capacity and inductance), and the phenomenon of damping. This leads to an elementary consideration of tuning—the mechanical analogy of the tuning fork being cited. The characteristic properties of high-frequency currents and the principle of the electric transformer are also considered.

In connection with Sending (Chapter III), power measurements, the induction coil, and improved forms of contact-makers are briefly considered, and the arrangement of small and large transmitting circuits and aerials is described and diagrammatically illustrated. With reference to the half-tone blocks of aerials, in this and in most other "wireless" works, we would suggest that the aerial wires should be inked over before the block is made; usually their course is barely visible on the original print, and it is quite exceptional to see any trace of them on the block made from the latter.

In the well-known equation:—$n \times \lambda = 300 \times 10^6$, n represents the frequency in cycles per second and λ the wave length of the oscillation in meters, but why not adopt the more convenient form:—n, λ $(n \cdot \lambda) = 300$, in which n represents the frequency in kilocycles (kcy.) per second, and λ represents the wave length in km. (a most convenient unit for all practical purposes)?

The receiving chapter deals with coherers and magnetic, electrolytic, and crystal detectors briefly and clearly, but without going into constructional details or instructions and without considering improved forms of the various detectors; space limitations, of course, forbid such full treatment, but it would have been well to have included particulars of one or two of the receiving sets which have been specially designed for use on fishing vessels and in receiving time signals, &c.

In Chapter V, the characteristic features and relative advantages of the Telefunken, Poulsen and Lepel systems are very briefly stated and, in Chapter VI, the author passes on to station working. Under this heading are described a number of accessories and refinements used in modern wireless station circuits; these notes are continued in the next chapter where are considered recent improvements in tuning and directive working and the effects of daylight and the nature of the surfaces over which the radiations pass. The other miscellaneous points dealt with include secrecy of working, regulations for wireless communication at sea, time signals and wave meters. The final chapter deals very briefly with the requirements and elementary arrangements of wireless telephony and its circuits. The production of the work is excellent, and the author has wisely arranged for the Morse code to be printed clearly on a fly-leaf which can be detached for mounting.

An Elementary Course of Magnetism and Electricity. By C. H. DRAPER. London: Blackie & Son. Price 2s.

This little book forms Section VII of the author's Course of Physics, and is issued separately for convenience of use. It claims to be a course "suitable for those commencing the subject," and is "intended chiefly for the laboratory." And so, to justify its first claim, we find it providing in the first chapters a variety of simple experiments up to and including the mapping of magnetic fields. Then, after warning us that "the exercises in this chapter are of a less elementary character," we are introduced to the mysterious conception of magnetic moments and their comparison by an approximate method; and although we eventually arrive at the Law of Inverse Squares in the last chapter on Magnetism, we are even then only permitted to verify it approximately!

Electrification by friction, electrical machines, and condensers, are treated in a similar manner, the last paragraph on this subject containing the first mention of electric lines of force and the electric field.

Early in the chapter on Voltaic Cells, the author finds it necessary to insert an illustration of a terminal. We would suggest that the draughtsman would have been better employed in improving the perspective of fig. 413.

The chapters on Resistance and Ohm's Law are straightforward and much more satisfactory than the rest of the book, but even in these the diagrams are in many cases little better than useless. The diagrams are, in fact, the worst feature of the book, and setting aside the fact that the electric telegraph is not exactly a suitable topic for a laboratory book, the diagrams illustrating this subject deserve severe criticism. We feel sure that fig. 409 could be found in many electrical books over 20 years ago, and equally sure that the "Telegraph Circuit" of fig. 410 would puzzle the most precocious schoolboy who attempted to discover its meaning.

Such a book may prove useful to some people, but we venture to think that most teachers of electricity will not be impressed by it.—P.K.

Amendment of Patent.—MESSRS. KORTING AND MATHIESEN A.G. have applied for leave to amend the specification of letters patent No. 22,342 of 1904, for improvements in arc-lamp electrodes. (*Ill. Off. Journal*, page 697.)

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

The Mutual Protection of Engineers.

Recently in the experience of the staff of a large electrical manufacturing firm in the Midlands, an occasion has arisen demonstrating the urgent necessity for an organisation for the mutual protection of the engineers associated with such firms.

The situation has arisen as a result of the amalgamation of such firms under the British Electric Manufacturers' Association. This body, forming the nucleus of a gigantic trust, has for its purpose objects other than the control of prices. By their agreement it is, for instance, possible for them to prevent an engineer, who may have displeased those in authority, from obtaining employment in any constituent firm.

The realisation of this power has resulted in the proposal of a programme for curtailing the privileges and material compensations of our profession, as follows:—Extension of hours of employment of staff; reduction in holidays of staff; abolition of payment during holidays; reduction in status of staff engineers.

The precise instance referred to above as emphasing the disabilities under which engineers are labouring, related to the treatment of the staff by the management on the occasion of the introduction of a system always resisted by English engineers.

Both the shops and the offices were similarly affected, but while an explanation was afforded to the shops, their co-operation invited, and a bonus offered as a compensation, not only were none of these extended to the office staff, but when a diffident petition was submitted to the management expressing their views, it was ignored and unanswered.

The strong feelings aroused by this high-handed treatment were recognised by the management, who offered a belated explanation of the introduction of the system to which objection was taken, but plainly intimated that the difference in the treatment given to the staff and the shops was because of the fact that in the former case they had to reckon with individuals only, whereas in the latter there was a strong and united body of men to deal with. This is a question the solution of which lies in the hands of the younger members of our profession.

It is not suggested that anything in the nature of trade unionism should be aimed at, but rather societies of the nature of the Law Society or the Medical Association Such a society would not necessarily adopt an attitude of hostility to the managers of the Trust, but would protect individual members from any harsh and arbitrary abuse of the power with which such managers are vested.

You would be doing a real service to the profession by opening your columns to a discussion on the matter, and so assisting in the initiation of a movement which will be as far-reaching as it is inevitable.

It is quite possible that a new Society is unnecessary, since the Engineering Institutions, in which we hold controlling power, might be induced to extend their functions sufficiently to consider the material interests of their members.

Only an Engineer.

May 16th, 1913.

The Prevention of Accidents in Electric Lifts.

I am obliged by Mr. A. R. Leaver's reply to my letter, but apparently he does not appreciate the difficulties which must be overcome before a lock can be constructed which is really safe, and, because I have had every-day experience with lifts for a good many years past, I disagree absolutely with his statement that combined electrical and mechanical locks have been successfully applied to lifts for several years past.

I agree with Mr. Leaver that it is a matter of simplicity to connect the electric portion of the lock with the controller in such a manner that the motor cannot be started unless all the gates or doors are closed, and this is, naturally, the first idea which would occur to one when locking gear is required for a lift. But what about the mechanical portion of the locking operation? Neither mechanical nor electrical locking is sufficient by itself, and difficulties arise when an attempt is made to combine these actions so that the following conditions are fulfilled:—

1. Cage cannot move until the gates are both mechanically and electrically locked.
2. No gate can be opened unless the current has been cut off from the controller.
3. No gate can be opened unless the cage is opposite the floor.

The second condition is most important, for, as pointed out in my previous letter, it very often happens that intending passengers are waiting at various floors for the lift, who, by opening the gate, stop the cage when same arrives opposite their particular floor. Suppose, for example, the case of an automatic push-button lift (fitted with the ordinary modern locking gear) which has been called by a person at the bottom floor, and also suppose that, as soon as the cage has commenced to move, it is also required by another intending passenger who is waiting at the floor above. If the person on the upper floor uses the lift much he will soon find out that he can, by keeping pressure on the gate or door, open same as the lift passes, stop the cage by this means and appropriate same to his own use, instead of waiting until the person who first called the lift to the bottom floor has been served. Of course, this sort of thing may go on indefinitely in the case of a busy lift. The accident a short time ago in which the Duc de Lorge met his death, is one instance of the manner in which the proper operation of a lift provided with ordinary locking gear (such as Mr. Leaver appears to advocate) can be interfered with.

If your correspondent will refer to Patents 2,766 of 1905, 20,444 of 1910, 13,183 of 1911, and 26,802 of 1911, which fairly represent modern practice, he will find that in all cases the mechanical locking action can only take place after the cage has moved a certain distance from the landing. This locking action is accomplished by means of a spring-controlled lever, which can easily fail owing to the spring breaking or weakening, corrosion, or lack of lubrication, and in at least two of the above-mentioned locks, if the gate is not completely latched, the mechanical locking cannot take place, in which cases the lift could move away with the door not mechanically locked. As very often the lift door has the appearance of an ordinary room door, it can be seen how easy it is for a stranger to mistake the lift door for the proper room door, and, when the lock has failed, open the door and walk down the lift well.

Patent No. 2,766, of 1905, referring to doors fitted with switches and automatic catches operated by striker on cage, points out the various difficulties (such as making the electric locking and latching actions simultaneous) which must be overcome, but even in this patent the danger of the mechanical-locking lever failing has not been successfully obviated.

With due respect to Mr. Leaver's own experience with electric lifts, I venture to say that, judging from his remarks on the subject of locks, his experience has evidently not been sufficient to enable him to understand the various problems which arise in the design of lift safety locks, and which have only very recently been completely solved by but one type of lock.

W. J. F. Cooper.

London, *May 19th*.

Having inspected some hundreds of lifts by different makers, and having made a special study of the several locks used thereon and their failures, I have come to the conclusion that the absolutely safe combined electrical and mechanical automatic gate lock is yet to be invented. All automatic locks of this type have this vital failing, that on the gate being closed the control circuit is completed with the gate only latched, not positively locked, the locking device coming independently into action after the car has moved some distance away from the landing. Now these locking devices are generally operated by means of springs or by a gravity arm, and it is self-evident that

there is an element of danger here, for, should the springs break, as I have known them to do, or should the working parts not work freely for want of lubrication or through some other cause, the gate remains free to be opened when the car is away from that landing, and as your correspondent, Mr. W. J. Cooper, states, "is a veritable death trap." This is particularly so in the case of push-button lifts, where oft-times the lift wells are totally enclosed and the car cannot be seen from the outside. A person naturally under these circumstances, on finding that the door opens, steps into the well hole instead of the car, which should have been there, and the result is death or serious injuries. What is wanted is a combined electrical and mechanical lock which will positively lock (not latch) the gate before the control circuit is closed, the switch and locking device being so constructed as to be dependent on each other, so that if either should fail there is no possible chance of starting the lift away from the landing until the lock has been repaired. Seemingly this ideal lock cannot be made, for on reading a certain lift engineer's patent lock specification recently, I found it stated that the locking and closing of the control circuit cannot be done simultaneously. That being the case, I am under the impression that there is not existing an absolutely safe lock for lift enclosures.

W. H. Carroll.

London, E., *May 19th*, 1913.

Electric Lighting Fittings.

With reference to the many catalogues and lists recently published, illustrating and advocating indirect systems of lighting, do you not think that this is a case of misdirection of energy? Why in these competitive days do we want to go round the corner, as it were, to illuminate instead of directing light to where it is wanted by the shortest route?

Surely it is possible to design some form of screen to protect the eye from the glare of naked light, and at the same time to direct the rays in the required direction. Indirect fittings certainly bring back pleasing memories of school days, of evening prowls with what we termed our moth trap (consisting of a large saucer of treacle with a night light spluttering in the middle of it), but in these strenuous days of "candle feet" and "as the inverse square of the distance," indirect lighting seems very much like running half a mile in the opposite direction and sprinting back in order to be in time to catch a train.

Why waste energy, either physical or electrical, in pushing against the competition of other illuminants an obsolete and notoriously inefficient form of lighting, which is bad enough when both ceiling and reflectors are clean, but when the dust settles, is hopeless?

H. A. W.

Water Divination.

Your recent article on the "Dowsers" was somewhat crushing, but there are some big men on the other side. The late Sir Edward Fry, F.R.S., more than once successfully employed them to locate suitable sites for wells, and the late Marquis of Salisbury also gave evidence in their favour. The German Emperor believes firmly in their power after seeing how they were able to locate coins hidden underneath the carpets.

In 1909, the German Colonial Secretary officially "blessed" the divining rod of Herr Von Uslar, who had been extremely successful in showing where water could be found in German South Africa. He indicated 600 sites, borings were made in 163 of these, and, as a result, 117, or 79 per cent., were successful.

The late Sir Henry Harman had similarly good cause to believe in them. Acting on *scientific* advice, at Horsham he spent over £1,000 in sinking wells, without any success. He then called in the "Dowsers," who indicated a spot where water could be found at less than 20 ft. A well was sunk, with the result that an immense supply was found at 15 ft. only.

Bohemia's health resort, Podiebrad, came into existence through the "Dowsers'" success in finding a lost well.

These are only a few instances on the other side, which, perhaps, explain why the Local Government Board also show their faith in the water divining by allowing payments to be made for their services.

W. B. S.

[Despite the illustrious names arrayed against us, we are unabashed. The results of the recent tests showed that, as the Committee said: "Whatever sensitiveness to underground water may exist in certain persons, of which some evidence has been given, it is not sufficiently definite and trustworthy to be of much practical value. Moreover, the lack of agreement with each other shows that it is more a matter of personal mentality than any direct influence of the water. The diviners, as a rule, confine their attention to small streams of water, and as there are few places where these cannot be found they may well show a large percentage of success."

An examination of the diagrams given in the *Sanitary Record* clearly shows that the "indications" recorded by the diviners were absolutely haphazard, and bore no relation to any physical feature of the land whatever. People who can repose any trust in such performances must be lacking in the sense of humour.—Eds. Elec. Rev.]

LEGAL.

Glasgow Tramcar Accident Claim.

A Glasgow woman, who alleged that she was descending from the top of a car when it was suddenly started and she was seriously injured by being thrown to the bottom of the stairs, sued the Corporation, in the Court of Session, for £1,000. After the pursuer's evidence had been heard, the defenders tendered a sum and full expenses in settlement of the pursuer's claim. This tender was accepted.

Battersea Borough Council *v.* The County of London Electric Supply Co., Ltd.

This case on Tuesday came before the Court of Appeal, composed of the Master of the Rolls, Lord Justice Kennedy and the President of the Probate, Divorce and Admiralty Division, upon the appeal of the plaintiffs from the refusal of Mr. Justice Joyce, in the Chancery Division, to grant, upon the application of the plaintiffs, an injunction to restrain the defendant company from laying their electrical mains and conduits in Wandsworth Road, Nine Elms Lane, Battersea Park Road, York Road, or any other road, street or place within the Metropolitan Borough of Battersea.

It appeared from the statement of Mr. Hughes, K.C., in support of the appeal, that the company, having already made connections between the various areas of supply and between those areas and their two generating stations at Clerkenwell and Wandsworth, now proposed to lay a further main between their area at Southwark and a portion of their Wandsworth area, this proposed main to run from their generating station at Wandsworth to a sub-station at Southwark in accordance with (as defendants alleged) the provisions of Sec. 4, Sub-sec. 2, of the London Electric Supply Act, 1908, which provided that "an authorised undertaker or a specified company may also, by means of electric mains, make a connection between any two or more areas which that authorised undertaker or specified company is authorised to supply, or between any such area and generating station of that authorised undertaker or specified company." The learned counsel contended that the natural meaning of Sub-sec. 2 was to give to the defendants power to make a connection where there was none existing already, but that did not give them the right to make any number of connections. The defendants did not claim that the proposed connection was a necessity, and the sub-section only gave them the right to make necessary connections.

Mr. Sylvain Mayer followed on the same side.

Mr. Tyldesley Jones (with him Sir Alfred Cripps, K.C.), in support of the decision of Mr. Justice Joyce, said that if his learned friends on the other side were right, it meant that a company would have to lay all the mains they would ever require at first, and that if the company had ever made a connection between two areas, their powers had gone, and the result was that they could not afterwards connect up their generating station with their different areas. He submitted that that was not the proper construction of the sub-section, and that the decision of Mr. Justice Joyce was right.

The parties agreed to treat the motion as the trial of the action.

In giving judgment, the Master of the Rolls said that the case turned upon the true construction of Sec. 4, Sub-Sec. 2, of the London Electric Supply Act, 1908. Having stated shortly the facts of the case, he said that Parliament evidently seemed to have thought that is was for the permanent advantage and benefit that where there were various electric companies having separate areas, that they should be able to unite and operate, subject to the consent of the Board of Trade. Was it possible to say that under Sec. 4 there could be only one connection made? Making a con-

nection did not seem to him to mean the erection or construction of a particular tube or conduit. He thought it meant to connect up and do that which the agreement might authorise you to do and not once for all. He thought the learned Judge was right in the view he had taken, and that the relief the plaintiffs sought to enforce could not be sustained. For these reasons he was of opinion that the appeal failed, and as the parties had agreed to treat the motion as the trial of the action, the action would be dismissed with costs.

Lord Justice Kennedy and the President concurred.

BUSINESS NOTES.

Diesel Engines at the Ghent Exhibition.—In the Belgian Electrical Section at the Ghent Exhibition, MESSRS. CAREL FRERES, of that town, display, in addition to a 2,500-H.P. steam engine, three examples of the Carel-Diesel engines, a 100-H.P. four-cycle engine, a 1,500-H.P. reversible six-cylinder engine, and a 1,000-H.P. two-cycle four-cylinder engine, the last-named being coupled to a generator, and used in connection with the electric lighting of the Exhibition.

Electric Cooking.—MESSRS. GILLESPIE & BEALES, sole wholesale selling agents for the "Tricity" cookers are prepared on behalf of their principals and manufacturers, the British Electric Transformer Co., Ltd., to enter into correspondence with electricity supply undertakings for the purpose of arranging cooking demonstrations of the "Tricity" cooker, which demonstrations would be given by Mr. F. S. Grogan. Messrs. Gillespie and Beales would be pleased to hear from those engineers who are desirous of taking advantage of this means of introducing electric cooking on their system, and to place their experience at the disposal of those who communicate with them.

Book Notices.—"American Telegraph Practice." By Donald McNicol. 1913. London: Hill Publishing Co. Price 17s. net.

"The Mechanical Engineer's Pocket-Book." By D. K. Clark and H. H. P. Powles. 1913. London: Crosby Lockwood & Son. Price 4s. 6d. net.

"Fifth Annual Report of the Hydro-Electric Power Commission of the Province of Ontario." 1912. "Rules and Regulations for Inside Electrical Installations." 1913. Toronto: L. K. Cameron.

"*Journal* of the Franklin Institute." Vol. CLXXV, No. 5. May, 1913. Philadelphia, Pa.: The Institute. Price 50 cents.

"Apparatus for the Exact Analysis of Flue Gas," by George A. Burrell and Frank M. Siebert. "The Preparation of Specifications for Petroleum Products," by Irving C. Allen. "Metal-Mine Accidents in the United States during 1911," by Albert H. Fay. "Ignition of Mine Gases by the Filaments of Incandescent Electric Lamps," by H. H. Clark and L. C. Ilsley. "Sampling Coal Deliveries," by George S. Pope. "Oil and Gas Wells through Workable Coal Beds," by George S. Rice and O. P. Hood. 1913. Washington: Government Printing Office.

"*Proceedings* of the Engineers' Club of Philadelphia." Vol. XXX, No. 2. April, 1913. Philadelphia: The Club.

"*Bulletin* de la Société International des Electriciens." Vol. III, No. 24. April, 1913. Also "Annuaire pour 1913." Paris: Gauthier-Villars.

"Atti della Associazione Elettrotecnica Italiana." May, 1913. Milan: Stucchi, Ceretti & C. Price L. 1·50.

"Science Abstracts." Vol. 16, Part 4. April 30th, 1913. Sections A and B. London: E. & F. N. Spon, Ltd. Price 1s. 6d. net each.

"Wiring Diagrams of Electrical Apparatus and Installations." Price 8s. 4d. net. "Dynamo Laboratory Outlines." By John Fay Wilson. 1913. Price 4s. 2d. net. London: Hill Publishing Co.

Transactions of the University of Toronto Engineering Society." Vol. VII, No. 6. April, 1913. Toronto: The Society.

"*Journal* of the American Society of Mechanical Engineers." May, 1913. New York: The Society. Price 35 cents.

"*Journal* of the American Institute of Architects." Vol. 1, No. 5. May, 1913. Washington: The Institute. Price 50 cents.

"*Boletin* de Ingenieros." Vol. III, Nos. 7 and 8. March 16th and April 16th, 1913. Mexico: Departmento de Ingenieros de la Secretaria de Guerra.

Under the title of "Motor-Car Troubles: Their Symptoms and Their Cure," Messrs. Harper & Bros. are shortly issuing a pocket-book for motorists, by H. W. Slauson, M.E.

We have received a copy of the second edition of No. 1 of the *Asteroid*, the official organ of the B.T.H. Social Club. The publication is the *Donuts' Magazine* under a new name, this change following upon a discontinuation of its former name by the Donuts' Society. The new name is adopted because the aim of the magazine is to act as "the connecting link which will complete a well-ordered system of social activities" in B.T.H. circles. Furthermore, the B.T.H. telegraphic address is "Asteroidal." There is a good deal of interesting matter relating to club and such-like doings, with some versification, sketches, and, of course, a pretty considerable spice of humour. Mr. T. H. Relton is the editor.

Price Reduction.—MESSRS. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., announce reductions in prices of rubber insulated wires and cables, owing to the fall in the market price of rubber.

British Trade in British Guiana.—A report to the Board of Trade from its correspondent in British Guiana points out that greater quantities of machinery and wire for electric lighting come from the United States than from the United Kingdom. The Electric Light Co., in Georgetown, was started, and is maintained, by Canadian capital, and it is possible that purchases of their electric light plant are made in the States as a matter of convenience, especially as there is a varied and cheap supply of such articles to select from in that country. It may be, however, that some of the articles credited in the trade returns to the United States are really of Canadian origin, consigned through New York.

Speaking generally with reference to British efforts to extend trade in British Guiana, it cannot be said that British commercial travellers handle their samples to the utmost advantage. Travellers frequently represent upwards of six houses each, and, consequently, carry a numerous variety of samples, with many of which they are not infrequently entirely unacquainted. On the other hand, travellers from the United States specialise, so to speak, and each traveller carries with him the lines with which he is thoroughly conversant. It naturally follows that such intimate knowledge, well applied, helps to secure orders which might otherwise be lost.

Freight rates naturally have a direct effect on the selling price of imported goods. Great Britain's only competitor in British Guiana which has an advantage in freight rates is the United States, and, from inquiries made amongst importers, it would appear that freight on most goods from the United States averages 12 cents per foot, as against 21 cents per foot from the United Kingdom. Reducing these rates to a basis of value so far as it is possible to do so, it is reckoned that the Americans have an advantage in freight rates equal to an average of about 1 per cent. of the value of the goods. The rates of exchange are also in favour of the United States bills being obtained on New York at ½ per cent. discount, whilst a bill on London is at a premium of 1½ per cent.

American manufacturers, it is understood, seldom or never make any charge for packages or packing, and the absence of these charges, even if it does not in all cases reduce the landed cost of the goods from that country, removes a cause of irritation to importers who object to seeing these small extra charges on invoices. Complaints are also made that the majority of British houses do not pay sufficient attention to detail and to keeping their catalogues and price lists up-to-date, the Americans and Germans being ahead of them in these respects. Most British firms are said to supply the same catalogues year after year with very few, if any, additions thereto, whereas the American and German firms are always issuing new and up-to-date lists profusely illustrated with drawings, photographs, &c., and containing minute descriptions of even the smallest articles.

Another matter in which the British manufacturer is said to show to disadvantage as compared with foreign firms, is in the manner in which certain articles are prepared for sale. Goods imported from America and Germany are, as a rule, very attractively got up, so that given two articles of the same kind and selling price, the smart and attractive appearance of the foreign made one will usually result in its being taken in preference to a less attractively got up article of British manufacture.

On the whole, British trade would be assisted by the sending of fewer catalogues and more commercial travellers. The value of the catalogue as an advertising medium is quite realised, particularly in certain lines of business, and no doubt it yields profitable results, but as a method of creating openings for British trade it is overdone, and a smart traveller, with a good knowledge of his business, will do more to extend British trade in a week than advertising by catalogue will do in 12 months. American and German manufacturers will, as a rule, go to quite a lot of trouble to suit their customers' tastes, and their obliging disposition not infrequently secures for them a certain amount of trade which otherwise might have remained with British firms. It is mostly in the cheaper classes of goods that Britain is losing ground. Where quality is a prime consideration she can still hold her own, but in nearly all the Crown Colonies and Protectorates situated within the tropical belt, cheap articles find a ready sale, so that the British manufacturer cannot afford to despise the production of cheap and low grade quality even although he may feel disinclined to engage in such a trade.

Kobe Tramways.—The completion of the delivery of an order for 42 Warner trucks by the "M AND G" TRUCK AND ENGINEERING CO., LTD., makes 42 systems upon which the Warner axle has been fitted to date, including, we understand, no fewer than 10 lines in the United States. The first British passenger coach fitted by the same firm for the Warner International and Overseas Engineering Co., Ltd., has just been completed and successfully run for Whitsun traffic to, we are informed, the entire satisfaction of the railway company's engineers.

After the Fire.—The works of MESSRS. ENGINEERING AND ARC LAMPS, LTD., Sphere Engineering Works, St. Albans, Herts, are now in full running order again after the disastrous fire, which did damage to the tune of more than £3,600, on March 8th. One photograph before us shows how extensive was the damage, while a second shows part of the works with all its repairs completed. The company manufactures here its well-known arc lamps and accessories, but it also undertakes the production of repetition work, stampings, spinnings, &c.

Electric Clocks.—The following further communication has reached us from THE MAGNETA TIME CO., LTD.:—"Referring to the communication from your correspondents in this week's issue of the ELECTRICAL REVIEW, until quite recently the Office of Works has issued official tenders for the supply of electric time

systems for the Post Office. Since the termination of that arrangement we have naturally been receiving the official orders and communications from the Stores and other departments of the Post Office. However, we are well content with the fact that all the chief postal distributing centres of London, including the galleries containing that huge mass of telegraph instruments at the central telegraph station, are equipped with Magneta, and we think your correspondents will understand that we are not very deeply concerned with the particular routine which the Government adopt in ordering their apparatus, or even the colour of the official form embodying the order. We mention this as we have both kinds on our files, and it may be interesting to note that the official orders of the Office of Works are on light buff paper, and those of the Post Office on white!"

The Lighting of York Minster.—One of the most interesting of recent installations of Osram lamps for ecclesiastical authorities is that in the choir of York Minster. The installation of electric light has been so arranged that it enables the beautiful

THE CHOIR AT YORK MINSTER.

carving of the stalls, and the delicate tracery of the walls and vaulting, to be seen in all their pristine beauty, and at the same time preserves them from deterioration caused by deposits formed from other illuminants.

Bankruptcy Proceedings.—J. G. M. HILTON, electrical engineer, Birmingham.—Receiving order made May 15th on a creditor's petition.

Lists Wanted at Catumbella.—The manager and engineer of the Lobito, Benguella and Catumbella Electric Light and Power Co., Ltd., Post Office Box 25, Catumbella, Portuguese West Africa, asks us to state that he will be pleased to receive price-lists, catalogues, pamphlets, &c, from manufacturers of installation, lighting and power house accessories, E.H.T. line materials, &c.

Catalogues and Lists.—ST. HELENS CABLE AND RUBBER CO., LTD, Warrington.—New illustrated list (24 pages) of electrical cables and safety insulating appliances. In addition to particulars of the patent cab tire sheathed cables, several items are described, including patent electric vulcanisers, specially designed for jointing and repairing C.T.S. cables; insulating shoes of a novel type, the wear being easily apparent, and the buckle allowing for various sizes of feet to be used in the same shoe; insulating gloves with cab tire facing, also rubber switchboard matting with cab tire facing. A couple of photographs are included, to show the firm's considerable business with colliery cables of Dialite and cab tire sheathed types. Prices for rubber-insulating cables, including the C.T.S. type, were reduced on May 10th by about 7½ per cent.

THE SCHNIEWINDT ELECTRIC CO., Staniforth Street, Birmingham.—Postal card, drawing attention to the Schniewindt resistance material.

MR. JOHN JARDINE, Dearing Street, Nottingham.—Sheet No. 63 (B Department) gives illustration and particulars of a new pattern of cast-iron pulley.

THE BRITISH ALUMINIUM CO., LTD., 109, Queen Victoria Street, London, E.C.—New illustrated circulars; one relating to connectors for stranded aluminium conductors, and the other showing the use of aluminium feeders for railway electrification.

MESSRS. WALLACH BROS., LTD., Royal London House, Finsbury Square, London, E.C.—New edition of their catalogue (56 pages) entitled "Blue Book of Safety Appliances." It contains fully illustrated particulars of smoke helmets, respirators, eye and hand protectors, rescue apparatus, first-aid equipments and cabinets, saw guards and other devices.

THE SUN ELECTRICAL CO., LTD., 118 and 120, Charing Cross Road, London, W.C.—Folder No. 243 gives illustrated particulars and prices of their stoneware electric heating apparatus. Folder No. 244 shows and describes the "Rawlplug" method of fixing screws in plaster, brick, metal, and in any substance in which a hole can be drilled or jumped. These plugs are manufactured in a large variety of sizes. Instructions for using are given. Details and prices of their buckle clips for use in conjunction with Rawlplugs for fixing tubes and cables are also included. The Sun Co. are manufacturers of the Buckle clips and wholesale distributing agents for the plug referred to.

MESSRS. SIMPLEX CONDUITS, LTD., London and Birmingham.—Folder relating to a "demon in the house," which upon further inquiry proves to be the kitchen range. The letterpress aims at assuring the reader that none of the drawbacks of the said range are found in the "Plexsim" electric cooker, nor will the latter perplexsim or disgust him as does the other "elaborate and costly abomination." Contractors and central station engineers can have supplies of the folder bearing their names and addresses.

THE GENERAL ELECTRIC CO., LTD., 67, Queen Victoria Street, London, E.C.—Leaflet No. 1,688 gives illustrations with brief particulars and prices of a number of artistic and novel electric bell pushes in silver, glass, &c.

MESSRS. SIEMENS BROS. DYNAMO WORKS, LTD., 38 and 39, Upper Thames Street, E.C.—Two new price leaflets: No. 215.6 showing a nickel-plated electric toaster; and No. 215.7 illustrating and pricing new designs of electric water-heaters, saucepans, &c., with renewable elements.

Trade Announcements.—THE CRYPTO ELECTRICAL CO., of Bermondsey Street, London, S.E., announce that their works will be closed for stock-taking on Friday and Saturday, 30th and 31st insts.

MR. PAUL FREDK. OTTO has taken over the business of Messrs. Lindsay & Co., electrical engineers, of Rose Place, Liverpool.

Expansion of business in the South-Western district has led MESSRS. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., to open a new branch at 56, Victoria Street, Bristol, where large stocks will be held. Mr. E. H. Brown, for more than 12 years in the sales department at the company's head office, is manager of the new branch. Mr. T. J. Hudson will in future devote his attention entirely to the South-Eastern district.

MESSRS. WM. MCWHIRTER & SON have greatly extended and re-organised their works in Glasgow, and these are now under the direct management of Mr. A. S. McWhirter and a technical staff. The firm have recently opened new works at Wharf Street, Cardiff, where a complete modern plant has been installed. The works are situate on the Glamorganshire Canal, and close to the railways and docks. Mr. A. C. McWhirter is managing the Cardiff branch. It is 30 years ago since the firm opened their first works in Glasgow. They now confine themselves almost exclusively to electrical and mechanical plant repairs.

Increasing business has led MESSRS. S. BILL & CO., LTD., to take larger premises at 146, Queen's Road, Aston, Birmingham, and all communications and goods should be sent there. The new premises are equipped with up-to-date appliances for the manufacture of electric switches, fuses, and other electrical accessories, also cabinet work for motor-car, telephone and electrical purposes.

Dissolutions and Liquidations.—GILBERT ARC LAMP CO., LTD.—With reference to the notice appearing in our issue of April 25th, we are asked to state that this liquidation is merely a formal matter, the whole of the assets and liabilities of the company having been taken over by Messrs. Engineering and Arc Lamps, Ltd., of St. Albans.

H. A. HARVEY & CO., LTD.—Mr. D. L. Honeyman, 18, St. Swithin's Lane, E.C., was, on 9th inst., appointed by the Court receiver and manager on behalf of the debenture-holders of this company.

ELECTROCARS, LTD.—A meeting will be held at 3, Great St. Helens, London, E.C., on June 16th, to hear an account of the winding up from the liquidator, Mr. J. E. Denney.

LINDSAY & CO., electrical and mechanical engineers, 95, Rose Street, Liverpool.—Messrs. H. L. Crauford and P. F. Otto have dissolved partnership. Mr. Otto will attend to debts and continue the business under the same style.

GEM DYNAMO BRUSH CO., LTD.—This company is winding up voluntarily, with Mr. J. W. Massey, 46, Cherry Street, Birmingham, as liquidator. A meeting of creditors is called for June 2nd.

SAMUEL HARTFORD & CO., LTD.—Mr. F. H. Thornton, 51, North John Street, Liverpool, was on April 4th appointed receiver on behalf of the debenture-holders.

LIGHTING and POWER NOTES.

Argentina.—For the past few years the Compania Alemana Transatlantica de Eléctricidad has been reducing the price of current for lighting purposes in private houses in accordance with the terms of its contract, the price for 1913 being 29 cents paper per KW.-hour. It has not, however, reduced the price for current for heating purposes, &c., in private houses, the rate for this being 28.4 cents, which is a fraction more than half a cent under the lighting tariff. As this company is pushing the application of electricity for heating purposes in houses, the *Review of the River Plate* suggests the advisability of a lower rate for heating.

Balearic Isles.—A central electric lighting station has just been completed and put in operation in the little town of Campos, in the Balearic Isles.

Barnsley.—In the annual report of Mr. E. A. Barker, borough electrical engineer, figures are given which show that there was an increase of 257,236 in units sold in 1912-13, as compared with a year ago. The following figures are also given (the figures in parenthesis being those for 1911-12):—Consumers connected 1,142 (1,063); equivalent 8-C.P. lamps, 91,427 (85,870);

new consumers, 79 (92); motors on mains, 159 (148); equivalent 8-C.P. lamps, 24,120 (20,960); public arc lamps, &c., 110 (110); public incandescent lamps, 724 (707); units sold, 2,055,570 (1,716,245). The average price paid for coal was 8s. 10d. per ton (6s. 3d. per ton), whilst the amount of coal used to generate 1 unit of electricity in 1913 was 6·27 lb. (8·58 lb.).

Bexley.—The U.D.C. has applied to the L.G.B. for a loan of £450 for the enlargement of the battery, and £575, part of the cost of reconstructing the H.T. switchboard. The balance of the cost of the latter work (£275) will be charged to the revenue of the year in which the work is completed.

Birmingham.—The accounts of the electricity undertaking for the year ended March 31st last showed a gross profit of £136,363, as against £150,295 in the previous year. After meeting all the charges for interest and sinking fund, there remains a balance of £27,634. Of this sum £6,000 has been carried to the renewals fund, leaving a surplus for the year of £21,634, which it is proposed to give in aid of the improvement rate. This sum represents a little more than was paid to the improvement rate in the previous year. The surplus for the year ended March 31st, 1912, amounted to £21,581. The total expenditure for the year under review amounted to £170,482 (£138,430 previous year), of which £98,049 represents the cost of generation, £21,367 the cost of distribution, and £21,182 the cost of management. Of the total income (£306,845, as against £288,725, previous year), £300,596 resulted from the sale of current, £203,755 representing lighting and power meter sales, and £98 687, the value of the units sold for traction purposes. In addition to the £300,596, £5,507 resulted from the hire and hire-purchase of motors, arc and incandescent lamps and other apparatus. The total number of units sold during the year amounted to 63,250,492, as against 40,190,547 in the previous year, of which 42,197,153 were for lighting and power, and 21,053,339 for traction. The average price per unit sold was 1·16d. The Electricity Committee reporting on the year's working, states that the financial result for the year has been affected by several causes. First, the reduction in rates of supply, which took effect from April 1st, 1912, has naturally reduced the revenue substantially; while there is no doubt that the output has been increased in consequence of the reduction in charges, the amount by which the receipts have been reduced being approximately £30,000. In addition, the effect of the coal strike on the quality and price of the coal purchased during the year cost the department about £9,400. Increased wages to workmen, over and above normal advances, cost about £1,200, and service connections £4,100, making a total of £44,700. As regards the result of the reduction in rates, the Committee states that it is obvious that this is felt most severely in the first year of operation, but, from past experience, it is satisfied that the increased output in the next year or two will more than compensate for the fall in revenue. The output for private lighting and power has shown a substantial increase, the units sold being 26·3 per cent. higher than in the previous year. The money value for this supply shows an increase of 4·25 per cent. There is an increase in the output for the tramway supply of 29·4 per cent., and an increase in the money value of 15·8 per cent. The revenue account has been debited with a charge of £2,351 in respect of new meters, and £5,076, the cost of service connections, which is now entirely borne out by the department, and not partially charged to consumers, as in previous years. The net increase in lamp connections (lighting only) is 21,173 60-watt lamps, and in motors connected 12,344 H.P., or 9,208 KW. These increases compare very favourably with previous years. The total length of new mains laid during the year has been 85,367 yards.

Blean (Kent).—The B. of G. on May 15th appointed a Committee to consider the advisability of having the workhouse premises lighted by electricity, which, it is considered, could be generated at very little cost.

Bolton.—In connection with the new electric power station at Back-o'-th'-Bank, the L.G.B. has sanctioned the borrowing of £24,344 for buildings, £26,266 for turbo-alternators, &c., and £16,238 for boilers, economisers, and steam pumps.

Bridlington.—The sanction of the L.G.B. has been received for the borrowing of £4,400 for 17 years, and £600 for 30 years, for extensions to the electricity works.

Burnham (Somerset).—The U.D.C. has approved of the proposal of Dr. Purves, of Exeter, to form an Electric Supply Co. with a capital of £5,000, instead of £10,000, as originally intended.

China.—According to the *Indian Textile Journal* the negotiations for the lighting of Wuchang city by electricity have been completed, an exclusively Chinese company having been formed with Government assistance for this purpose. The complete power station plant will be supplied by Messrs. Siemens China Electrical Co., and will include, to start with, two 400-H.P. three-phase generating sets which will supply by means of a network of overhead lines. The power plant will be laid out to accommodate turbines at a later date, and will be run entirely under Chinese supervision.

Continental Notes.—AUSTRIA.—The Siemens-Schuckert Co., of Vienna, is reported to have purchased the central electric lighting station at Soborten, near Teplitz, Bohemia, for the sum of £40,000, with the view of considerably extending the same.

FRANCE.—The central station at Wasquehal, of the Société Electrique du Nord de la France, which is supplying current for lighting and traction purposes to an area of over 200 miles, and which has a capacity of 34,000 H.P., is to be further extended to 52,000 H.P. Orders for two new steam turbines and generators, each of 6,000-KW. capacity, have just been placed with the Compagnie Electro-Mecanique.

ROUMANIA.—La Société d'Electricitè de Ploeshti, which owns the concession for the supply of electricity for lighting purposes in Ploeshti, has applied for the concession to construct and work a system of electric tramways in the town.

RUSSIA.—La Société des Tramways et Eclairage Electriques de Vladicaucase in its report for 1912, states that the year witnessed the greatest development in the company's electric lighting undertaking since its establishment, the number of clients increasing during the 12 months from 755 to 938. Current is now being supplied to 20,101 incandescent, and 109 arc lamps, as also to 77 electric motors. Owing to the great increase in the cost of petroleum, electric lighting is now being adopted by small householders, and with a view of meeting the increased demand, a new Diesel engine and generator is to be installed at the generating station.

SPAIN.—Good progress is being made with the establishment of the new hydro-electric stations of the Barcelona Traction, Light and Power Co., Ltd. The plant at Seros, which will have a capacity of 56,000 H.P., is expected to be completed by the end of the present year, while one of 81,000 H.P. that is being established on the River Pallaresa, will, it is anticipated, be completed in 1914.

Eltham.—The Avery Hill Training College hostels are to have an E.L. installation at a cost of £1,139.

Felixstowe.—The Suffolk Electricity Supply Co., in co-operation with the U.D.C., has arranged to supply current for lighting and heating to tents on the beach at a fixed charge of 10s. for the season, the charge for connecting up being 5s. Some 250 sites for tents have been let this year by the U.D.C.

Fife.—At the Blairenbathie Colliery, Kelty, a large electric installation is being rapidly pushed forward.

Galashiels.—It has been decided not to make the local electrical supply a municipal scheme. Support will, however, be given to the proposed local company on the understanding that a satisfactory arrangement is made as to the maximum charges for public and private light and power. Terms will also be stated on which the undertaking can be acquired by the T.C.

Hastings.—At last Friday's meeting of the T.C., it was decided to light the unfinished west arm of the Harbour works with electricity. A watertight fitting is to be erected at the end to hold three 80-watt lamps, the whole cost being estimated at £150. At present the lighting by oil lamps costs, with labour, £43 a year, and by laying a submarine cable and installing the electric light, the annual cost will be reduced to about £12. The Harbour works, it may be explained, are derelict. The Commissioners have no funds, and the Corporation illuminates the works for the protection of the fishery. Both the B. of T. and Trinity House have refused to take up the matter.

The B. of T. has granted an order to the T.C. authorising the Corporation to supply current to property at Ore, which is outside the borough.

Hebburn-on-Tyne.—In regard to the recent explosion at Hebburn-on-Tyne, by which two lives were lost, the Council has resolved to call the attention of the B. of T. to the matter, and to request it to hold an inquiry into the circumstances of the explosion, and the general conditions and method of laying cables in the district, and to ascertain whether any, and if any, what steps should be taken or regulations made to ensure the safety of the public. The Northern Counties Electricity Supply Co. gave the Council notice that it intended to lay H.T. cables underground from Ellison Street along Lyon Street into the Hebburn "C" Pit, and the Council resolved that, so far as its approval may be necessary, it does not approve of laying the said cables unless they are lead-sheathed and in earthenware troughs.

Hendon.—The R.D.C. has sealed an agreement with the Colne Valley Electric Lighting Co. for the supply of current in part of the Council's area. It is hoped that a supply for Pinner will be available this year.

Henley-on-Thames.—The Reading Electric Supply Co. has decided to ask the B. of T. to override the decision of the R.D.C., which has refused consent to the company supplying electricity to houses at Shiplake. At a meeting of the Council on May 13th, the clerk expressed the opinion that the B. of T. would not accede to the company's request.

Horsham.—A L.G.B. inquiry was held on May 16th into the application of the U.D.C. for a loan of £2,000 for the provision of a refuse destructor at the electricity works. It was stated that the Council was likely to profit from the use of refuse as fuel, and that the destructor would be dealt with as adjunct to the electricity works. The value of the refuse to be dealt with from a fuel point of view was placed at £435 per annum. There was some opposition on the ground that the destructor would be a nuisance.

Ilford.—The engineer has been instructed to report on the electrical equipment required in connection with the Council's proposal to install a refuse destructor. In connection with the removal of the centre columns in High Road, the electrical engineer reporting upon the sample fittings he had erected near the Broadway, states that it is impossible to see the effect of these lamps until after 11 o'clock in the evening, in consequence of the number of private lamps in the neighbourhood, which are kept

alight to that time. The Electricity Committee has deferred the consideration of the report until it has had a chance of inspecting the fittings.

India.—Bombay Mill Installations.—In connection with our recent note regarding the motor and transformer equipment for the textile and flour mills in the Bombay district, which are to derive their power from the mains of the Tata Co., we are now enabled to give further particulars of the valuable contract which has been secured by the British Westinghouse Co. The motors are all of the Westinghouse slip-ring protected type, suitable for double drive, and for three-phase current, at 2,000 volts and 50 periods. There are at present a total of 207 motors of this type on order, the sizes ranging from 50 B.H.P. to 500 B.H.P. The motor speeds are 290 R.P.M. and 365 R.P.M., there being several of each horse-power capacity at each speed, coupled direct to the line shafting in the great majority of cases without the intervention of countershafting. The motor switch pillars are of the Westinghouse ironclad type "S" pattern, which are so largely used in mining and other industrial work in this country, and starting is affected by liquid controllers. The transformers are Westinghouse three-phase oil-immersed self-cooled units, and reduce the supply pressure from 6,000 volts to 2,000 volts for the motors. They number 64 in all, and are of four sizes, thus: 22 of 500 K.V.A., 14 of 600 K.V.A., 21 of 700 K.V.A., and seven of 900 K.V.A. The mills in which the above-mentioned equipment is to be installed are as follows:—Pearl, Finlay, Simplex, Naiguam, Swan, Bombay Cotton, Jamshed, Nahomednhay, Pabahey, Crescent, Fazulbhoy, David No. L. and 2. Down, Standard, Phœnix, Gold Mohur, Jubilee, Crown, Western India, Apollo, Ripon, Dharamsey, Hope, Alliance, Matildas Goculdae, New City of Bombay, Colaba, New Great Eastern, Sun, Bombay Flour, Merchants Flour, and Union Flour. These particulars give some idea of the importance of this immense scheme for mill electrification, to which we hope to refer in detail at an early date.

Ipswich.—The report of Mr. Ayton, the Corporation electrical engineer, on the working of the electricity department for the year ended March 31st last, discloses a loss of £1,708, due more than anything to bad luck. The total revenue amounted to £24,733, and working expenses to £16,899, leaving a balance of £7,833 to meet financial charges. Interest and sinking fund amounted to £7,908, and, in addition, £1,633 capital charges on new plant, &c., was met out of revenue, leaving a balance on the wrong side as mentioned. This was made good from the reserve fund, which is reduced to £815. The department's bad luck arose from the coal strike, which it is estimated cost an extra £1,000, and, unfortunately, troubles with the recently installed turbine plant deprived the department of its assistance, and reconstruction work involving the running of the plant non-condensing also told its tale. Two turbine units are now running satisfactorily, but the capital charges for the year were increased by them, although they were not then in use. The units sold for all purposes were 2,606,119, as compared with 2,050,885 in 1911-12; power units jumped from 763,183 to 1,247,077, the motor H.P. increasing from 1,903 to 2,299. The power station capacity increased from 1,511 to 3,511 KW. Mr. Ayton draws attention to the necessity of having a hiring scheme in operation, in order to develop electric heating and cooking; also he refers to the possibilities of the electric vehicle and the advantage to the undertaking of encouraging its use.

Japan.—The Tokio Electric Bureau have lately issued a report for the 20 months from August, 1911, when the electric lighting and tramway undertakings in the city were municipalised, and during that period a profit of £546,052 was made.

Johnstone.—Messrs. Strain & Robertson, the engineers to the Clyde Valley Electrical Power Co., have notified the T.C. that at the expiration of one month they propose carrying out certain operations within the burgh. The Council has considered the proposal, which involves the laying of cables below the roadways, and decided to object to the plan. Other questions with reference to the future negotiations anent electric lighting were remitted to the Electricity Committee for further consideration.

Kettering.—The U.D.C. has applied to the L.G.B. for a loan of £1,600 for a new feeder cable, &c., and has decided to install at the electricity works a water softening plant, dealing with 1,500 gallons per hour, at a cost of from £160 to £170.

Ledbury.—The U.D.C. has decided not to offer any objection to a prov. order for electric supply being applied for by Messrs. Edwards & Armstrong, provided that plans for the generating station and the cable routes are submitted for approval.

Leeds.—The annual report of the working of the electricity department for the year ended March 31st last, shows a great development in the supply, due mainly to the growing power load, the increased output being 5,288,940 units, or over 29 per cent. The revenue amounted to £124,597 (an increase of £9,751), the expenditure was £109,088 (an increase of £10,307), and the surplus profit £15,508 (a decrease of £556). The reduced surplus is, however, more than accounted for by an increase of £1,885 in capital expenditure out of revenue. The total output sold was 23,130,512 units, as compared with 17,841,572 in 1911-12; this included 5,086,774 units for lighting, 895,247 units for street lighting, 14,152,395 units for power and heating, and 2,996,096 units for traction. The power units sold increased by 25 per cent, the H.P. of motors connected having risen from 17,291 to 22,096. The heating apparatus supplied increased from 380 to 683 KW. The revenue per lamp installed decreased from 4s. 5·5d. to 4s. 3·8d., but the maximum price for lighting was reduced from 4d. to 3½d. per unit in October, 1912; the revenue per motor H.P. installed also fell from £2 11s. 6d. to £2 10s. 9d. The maximum load on the generating plant increased from 9,560 KW. to 10,715 KW., the capacity of the plant remaining at 15,440 KW. Two additional 7,500-KW. turbines will shortly be added, bringing the plant installed up to 30,440 KW. The working expenses per unit remained stationary at ·44d. per unit, but the cost of coal in 1913 was ·17d., as against ·14d. per unit in 1912, the excess having been saved on other items.

The report refers to the increased price of coal and increased working expenditure, which more than counterbalanced the revenue increase; notwithstanding this, the capital charges being spread over a much greater number of units, resulted in the total cost per unit sold being ·20d. less than a year ago. An interesting analysis of capital expenditure allocates to the generating station, £413,558, or 37·9 per cent.; to mains, transformers, &c., £626,685, or 57·5 per cent.; and to cost of provisional order, discount on stock, premiums, &c., £50,403, or 4·6 per cent., of the total expenditure.

The Roundhay and District Lighting Co. has offered to sell its undertaking to the Corporation, and negotiations are proceeding.

London.—Hammersmith.—The B.C. has requested the Electricity Committee to consider and report upon the desirability of establishing a showroom in connection with the electric light undertaking of the Council for the purpose of demonstrating the uses of electricity, and particularly in the establishment of such a showroom in the proposed extended Town Hall.

Bermondsey.—The electrical engineer advises the strengthening and connecting up of the feeders in seven roads, also the laying of additional distributors, to cope with the next winter's demand. The cost of the work is put at £8,682, which is to be raised by loan and taken up as required.

Lowestoft.—The T.C. has received from the L.G.B. sanction to a loan of £3,000 for mains and £2,000 for house services.

Nelson.—The T.C. has resolved that application be made to the L.G.B. for sanction to borrow the sum of £4,000, estimated to be required during the next three years for mains and services.

Newport (Mon.).—With reference to the experiments which are being carried on for the lighting of a portion of Caerleon Road, the Gas Co. has written the Council offering to supply gas, light and extinguish, repair lantern, paint and generally maintain two-light inverted burner lamps for £5 14s. per lamp per annum, the first cost of the lamp with its burners and fittings complete being £2 0s. 9d, and the illuminating power 320 candles. The company, in the letter, also quoted for higher candle-power lamps. The borough electrical engineer reported that 11 incandescent electric lamps, each of 300 C.P., and one 500-C.P. lamp could be supplied for a payment of £70 per annum, as against the gas company's proposed charge of £68 8s. Having regard to the fact that the Corporation has the necessary supply ready to hand, application is to be made to the B. of T. for permission to use overhead cables for the supply of current to such lamps, and the Newport Gas Co. is to be asked to discontinue the lighting of the lamps in the road in question from and after September 29th next.

North China.—The Peking Chinese Chartered Electricity Undertaking is just now in a state of great prosperity owing to the settling down of the country after the revolution. Mr. Sillar reports the addition of from 7 to 10 new consumers every day, and with the three new Senate chambers and the opening of the Forbidden City for the use of the President and Cabinet, the supply has more than doubled in the last six months. President Yuan Shih Kai has alone installed about 4,000 lights, and Mr. Sillar, who was formerly chief at Colchester, is one of the lucky few who has a pass into the Forbidden City, which is classed by all who have seen it to be the finest Imperial palace in existence.

Peterborough.—On May 14th Mr. T. C. Ekin held an inquiry into the application of the T.C. for a loan of £7,000 for extensions to the generating plant—£3,850 for a 500-KW. steam turbine and generator with condenser; £1,480 for Lancashire boilers and setting; £960 for mechanical stokers; £170 for foundations for turbine and condenser; £150 for piping; £220 for switchboard additions; and £170 for contingencies. There was no opposition.

It was stated that Messrs. Barford & Perkins, engineers, required 300 H.P., of which 100 H.P. was to be installed now; the G.N. Railway also required a supply of power. The city engineer (Mr. J. C. Gill) said he hoped there would be another of the large works coming on the mains, and they hoped to get an extension of power business with small consumers. He should like to purchase a number of motors and hire them out, but he understood that the T.C. could not use its surplus for that purpose. The Inspector thought the Council had the necessary powers, and could adopt such a scheme if it wanted.

Pontefract.—The B. of G. has decided to obtain expert advice on the electric light arrangements at the workhouse with the object of carrying out improvements and alterations which will result in economy.

Portslade (Sussex).—In reply to inquiries, the U.D.C. has intimated that the question of electric light is receiving attention, but that there does not appear to be a possibility of a supply of electricity for the district at present.

Skye.—A large electrical installation is being carried out on the Island of Raasay, off Skye, on the West Coast of Scotland. This island was recently acquired by Messrs. William Baird & Co., ironmasters, and the extensive deposits of iron ore are to be worked. Electricity is being used for the purpose of operating the service railway, cranes, boring tools, and for lighting.

Stalybridge.—The Corporation has approved of plans of extensions, &c., at the generating station, Park Road, for the Stalybridge Joint Electricity Board.

South Africa.—The Cape Town city electrical engineer has decided, owing to the very large demand for free wiring installations, to temporarily suspend the application of the system, so that the department may be able to cope with the additional work of connecting up the new consumers. In addition to this work, the department is also extremely busy in rearranging the supply to the consumers recently taken over from the Cape Peninsula Lighting Co. Some of the suburbs are being entirely rewired with overhead cables. It is expected that the new alternating-current supply will be in use in Mowbray and Observatory early in May.

Torquay.—The General Purposes Sub-Committee of the T.C. has under consideration the question of installing electrical cooking apparatus at the new Town Hall.

Trowbridge.—The U.D.C. has referred to a Committee a letter from Mr. Ronald C. Taylor, asking for powers to supply current for power to mills in the town at ¾d. per unit, as the local electric supply company is not able to give a supply at the price.

Watford.—The B. of T. has granted a prov. order to the U.D.C. enabling it to supply current to the parishes of Abbotts Langley and Watford Rural.

West Hartlepool.—This Corporation is the first municipal authority to adopt a system of generating electricity from waste steam obtained from outside sources. Its new power station contains two turbo-generators, each of 1,500 KW. These are supplied with exhaust steam from the six blowing engines, which are served by 16 boilers. After passing through the condensers, the water will pass through a Lea recorder back to the boilers at the ironworks. To supply the condensers with cold water, three cooling towers have been erected, each capable of cooling 115,000 gallons of water per hour. The total cost of the new scheme is £38,795, the plant alone having cost £30,000. In return for the use of the exhaust steam of the Seaton Carew Iron Co., the company will receive a supply of electric current free. The coal bill for the old station was about £4,000 a year, and it is expected there will be a great saving by the new scheme. The old station will be maintained as a stand-by.

Whitehaven.—The *Whitehaven News* recently contained a report of a debate in the local T.C. on the question of increasing the salary of Mr. Sankey, the borough electrical engineer. The Committee proposed to give him a bonus on the profits, but an amendment was carried referring the matter back, apparently on the ground that the nature of the bonus had not been settled. Alderman Walker said he understood that the Committee was unanimous that Mr. Sankey should receive increased remuneration, and another member thought the proposal as it stood might involve an injustice to the engineer—the exact nature of the bonus not having been settled. A bonus scheme based on sound lines is, undoubtedly, an incentive to increased business, and the Council might do worse than obtain information from Marylebone on the subject.

Whitstable.—Negotiations have been carried on by the promoters of the E.L. Co. and the U.D.C., for the company to undertake the public lighting. The Council was offered 2 per cent. of the gross profits of the undertaking if it gave the company the whole of the street lighting, and on the Council deciding to grant half the lighting to the company, the promoters replied that under those circumstances they could give the Council only 1 per cent. of the gross profits. The Council has decided to adhere to the original offer of 2 per cent. if any of the public lighting is undertaken by the E.L. Co.

Wolverhampton.—The Corporation Electricity Committee has been authorised to arrange for an electrical exhibition at the forthcoming floral fête, at a cost not exceeding £200.

Wrexham.—There is a profit on the electricity undertaking for the past year of £482.

Yarmouth.—The L.G.B. is to be asked to sanction the borrowing of £3,840 for the purpose of substituting electricity for gas for street lighting purposes. The scheme provides for the conversion of all the remaining gas lamps in the borough, 105 of which are to be carried out during the present financial year.

It is intended to install at the electricity works two superheaters, at a cost of £400.

On May 15th a L.G.B. inquiry was held respecting the application of the T.C. for a loan of £11,590 for electricity purposes. There was no opposition.

TRAMWAY and RAILWAY NOTES.

Argentina.—According to the *Review of the River Plate*, the Concordia Tramways Co. has resolved to electrify its system.

Australia.—The city underground railway, which the Government intends to construct to relieve the congestion of traffic in Sydney, will be a three-line loop railway around the city, with connections to the eastern and western suburbs, and to North Sydney. Three lines will leave the great metropolitan Redfern Station on the northern side, and, falling in a grade of 1 in 40, pass wholly underground on the western side of the city, with stations under the principal city thoroughfares, to one of the city gardens known as Wynyard Square, in the vicinity of the Sydney General Post Office, where the first section will terminate.—*British Australasian.*

An electric motor street-watering cart has lately been put in service by the Melbourne City Council.

Ashton.—The manager of the tramways has reported to the Tramways Committee upon the question of removing the centre standards in the Stalybridge and Manchester Roads. He expressed the opinion that, inasmuch as the trolley wire would, under ordinary circumstances, last at least two years, it was inadvisable to incur the expense—£1,100 or £1,200, exclusive of the cost of new trolley wire and fittings—at present. The Committee felt that the suggestion for the removal of the centre standards was worthy of consideration, and decided that the matter should be raised again nearer the end of the life of the trolley wire.

Bradford.—Through the trolley of a tramcar coming off the wire last week, and the wire breaking and coming into contact with a car, considerable damage was done to the vehicle owing to its catching fire. There were few passengers on the car at the time of the occurrence, and, fortunately, no one was injured, though traffic was disorganised for some time. The broken wire was repaired, but upon another trolley being put on to it, it again broke, and a second car caught fire, the conductor and a passenger having a narrow escape. The cause of the mishaps is attributed to the fact that the tramlines in Toller Lane are "up," and the temporary rails are about 6 in. higher than the permanent way, causing greater pressure on the overhead wires.

Continental Notes.—ITALY.—So frequent have the labour troubles become with the employés of the Société des Tramways Napolitains, of Naples, that a novel departure has been made by the municipal authorities of the city with the view of putting an end to the difficulty. With this object, they have established a school where the police are being trained to drive electric tramcars, so that they may be in a position to assist in keeping the public service working. It is stated that no less than 300 policemen are now sufficiently trained to be entrusted with the driving of electric cars, should there be a further strike. The new departure is stated to have already had a beneficial effect on the attitude of the employés.

SAXONY.—It is reported that the Saxon State Railway authorities have decided on the electrification of their lines, and that in connection with the project several important collieries in Saxony have already been acquired by the State.

Douglas.—At a meeting of the T.C. last week, a member moved that all free passes held by aldermen and councillors in connection with the borough tramways be withdrawn. He declared that the inordinate use made of the passes interfered with the earning power of the tramways. The chairman of the Tramways Committee seconded the motion, but it was strongly opposed, and was lost by 13 votes to 4.

Dundee.—There was a lively debate at a meeting of the Corporation Tramways Committee following a report by Mr. Peter Fisher, the manager, on losses incurred on certain tramway routes. With regard to the High Street and Craig Pier route, on which there was an apparent loss of £600 per annum, the manager pointed out that if they stopped running to-morrow, they would not save one penny, so far as the wages were concerned. It was reduced practically to the price of electricity, and the saving would be so small that he would not advise discontinuance now. Later, Mr. Fisher told a councillor that he was not to put words in his mouth, and to his reply, the manager retorted "you are not to make a fool of me." Ultimately, Mr. Fisher's advice was accepted.

Egypt.—La Société des Tramways du Caire has applied to the Egyptian Government for a concession to construct and work a system of suburban electric tramways in the Province of Ghizeh, with the object of connecting Cairo with a series of populous villages at present without any system of communication. The system would extend to a distance of about 44 miles.

Edinburgh.—The members of the Corporation deputation who visited England to inspect and report on self-propelled cars, submitted their views at a meeting of the Tramways Sub-Committee of the T.C. The deputation visited London, Coventry and Morecambe, and were favourably impressed with the cars in operation in these places. It is understood there will be a recommendation for a trial of the system, in order to meet the difficulty that has arisen in Edinburgh. The report will be submitted to a full meeting of the Tramways Committee.

Ilford.—The tramways manager has presented his report upon the advisability, or otherwise, of the Council adopting a universal 1d. fare over the whole of the tramway system. The consideration of the question has, however, been deferred. The Council's agreement with East Ham Corporation for the lease, upon certain terms of the Ilford Hill track, and which expires on the 25th inst., is to be continued, subject to six months' notice on either side.

Japan.—A proposal was made some time ago in the Tokyo Municipal Assembly for the construction of two underground railways, one running between Jida-machi in Kojimachi-ku, and Mejiro in Koiskikawa-ku, under the control of the Johoku Electric Railway Co., and the other leading from Takanawa, Minami-cho, Shiba-ku, to Chayacho Asakusa-ku, *viâ* Ginza, and Ueno, under the control of the Tokyo Underground Railway Co. The Special Committee appointed by the Municipal Council for the investigation of the project has reported that although it approved the projects in principle, they must be rejected for the present, as they would interfere with the unification of the municipal systems of communication.

London.—An important question affecting the future of the tramway service in West London was raised at the Acton U.D.C. meeting on Monday. The clerk reported that the Parliamentary agents of the London United Tramways, Ltd. (Messrs. Stanley and Co.) wished to direct the Council's attention to the provisions of the Bill by which the London County Council sought power to enable it to work, when acquired from the company, such portion of the tramways in Hammersmith as the Council had not already powers to work. The London United feared that if the power was unconditionally conferred upon the L.C.C., it might result in the cutting of the tramway traffic at the county boundary, *i.e.*, the Askew Arms and Young's Corner, and so, amongst other things, cause very grave inconvenience to the travelling public. The company was, therefore, endeavouring to make the L.C.C.'s power of working the tramways, if granted, subject to an obligation to maintain the existing through-running facilities, and it was suggested that the Acton U.D.C. might be willing to support the opposition to the Bill on these lines. The Council decided to reply that its chairman, Councillor Boissonnade, J.P., would be willing to give evidence on behalf of the company in opposition to the L.C.C. proposals, having regard to the public interests involved, and to the fact that if the Bill, as drafted, became law, the Council was apprehensive of the breaking of the present through service of cars and the cessation of the through fares and booking arrangements.

Luton.—A further lease of the Corporation Tramways to Messrs. Balfour, Beatty & Co., Ltd., has been approved.

Milnrow.—At a meeting of the Tramways Committee last week, a letter was read from Mr. J. S. D. Moffet, general manager of the Rochdale Tramways, stating that the cost of the cars purchased in connection with the Milnrow tramways was £500 in excess of the amount provided for in the estimate. The L.G.B. is to be asked for permission to increase the borrowing powers for cars by £500.

Plymouth.—Mr. C. R. Everson, general manager of the Corporation tramways, in his annual report upon the working of the undertaking, states that the number of passengers carried for the year had increased by 438,725. This increase was due to the exceptionally fine weather experienced throughout last summer. Traffic receipts had increased by £1,855. The number of units used this year was 122,405 less than last year, although 6,641 more miles were run, showing that the motor-men had exercised more care in operating their cars. Traffic receipts totalled £37,083, and other receipts £2,087; the total revenue was £39,170. Working expenses accounted for £24,081, leaving a gross profit of £15,090. Other charges totalled £12,062, the net profit for the year in aid of the rates being £3,027. He was pleased to state that the improved trolley head he designed, which received their approval with instructions to fit it to the cars, had resulted in an absolute freedom from accidents from this cause. During the year they had renewed 2¼ miles of overhead work, and seeing that the gauge of the wire was larger and the fittings improved, he hoped they would be relieved of serious cost on these sections for some years. The total sum expended on permanent way repairs and renewals for the past six years amounted to £23,375.

Southampton.—The B. of T. has sanctioned the doubling of the tramway track in Shirley Road, and instructions have been given the general manager to carry out the work by direct labour. Tenders are invited for a supply of tramway points and tires. The receipts of the tramway undertaking for the year ended March 31st last amounted to £64,185, which represents an increase of £336 on the previous year. There was an increase of 46,892 in the mileage run, and an increase of 127,135 in the number of passengers carried. The amount of current consumed totalled 1,964,804 units, which, at 1½d. per unit, represents an expenditure of £12,280. Compared with the previous year the current consumed shows an increase of 125,383 units, but the cost of the units during that year amounted to £174 more than in the year under review, owing to the fact that the charge for current was then at 1¾d. per unit. The receipts per car-mile show a decease of ·263d. over last year.

Tynemouth.—The Tynemouth Traction Co. has written the Corporation expressing a hope that the negotiations for the extension of the tramways to Preston Village might result in the construction of that route at an early date, when the whole system of electrical distribution would have to be reconsidered. A reply is to be sent to the effect that the Council is waiting for the company with regard to the proposed extension.

Wishaw.—A conductor on the tramways at Wishaw, in an attempt to put a trolley pole back on the wire, was dragged off the car and suspended in mid-air. Before assistance could be rendered the rope broke and he fell heavily to the ground, his injuries necessitating removal to a hospital.

TELEGRAPH and TELEPHONE NOTES.

New Cable for Central and South American Telegraph Co.—The Central and South American Telegraph Co. recently contracted with the Norddeutsche Seekabelwerke, Nordenham, Germany, for the manufacture and laying of 771 nm. of cable, to be laid between Panama, Republic of Panama and Santa Elena, Ecuador. The Norddeutsche Co.'s cable steamer, *Stephan*, with the cable on board, sailed from Nordenham, April 7th, and was expected to arrive at Panama about May 20th.

The laying of this direct cable from Panama to Santa Elena will materially expedite the telegraph traffic to and from Peru, Chile and Argentine, and is a preliminary step in providing additional facilities for the anticipated extension of the Central and South American Telegraph Co.'s lines from Argentine to Santos and Rio de Janeiro, Brazil, which extensions, it is expected, will be completed within a year. This will provide an all-American cable route to Brazil, which Mr. James A. Scrymser, president of the Central and South American Telegraph Co., has endeavoured for many years to accomplish.

On her homeward trip the *Stephan*, it is expected, will take soundings between Buenos Ayres and Santos and Rio de Janeiro, covering the route on which the proposed cables are to be laid.

The average time of transmission between New York and Buenos Ayres, "*viâ* Colon," is now about 16 minutes, and it is expected, on the completion of these Brazil extensions, that the average time between New York and Rio de Janeiro will not exceed 20 minutes. —*Telegraph and Telephone Age.*

Wireless in the Antarctic.—Continuous communication is now maintained between Sydney, *viâ* Hobart and Macquarie Island, and Dr. Mawson in his winter camp in the Antartic. Dr. Mawson receives nightly wireless signals from Macquarie Island, the Government stations at Wellington (New Zealand), Melbourne, Hobart, and Pennant Hills, from warships and from shipping along the south coast.

CONTRACTS OPEN and CLOSED.

OPEN.

Aberdare.—May 29th. Cables, street work, junction boxes, incandescent fittings for street lighting, meters, &c., for the Council. See "Official Notices" May 16th.

Australia.—Victoria.—May 30th. High-tension switchgear with remote control, for the Melbourne City Council. See "Official Notices" March 28th.

June 2nd.—20,000-volt H.T. switchgear and L.T. switchgear and accessories, for the Melbourne Suburban Railways. See "Official Notices" May 2nd.

June 11th.—Switchgear and instruments, for the Melbourne City Council. See "Official Notices" April 25th.

June 24th.—H.D. copper wire, telephone parts and telephones, for the P.M.G. See "Official Notices" to-day.

July 1st. Telephone instruments and submarine cable, for the P.M.G. See "Official Notices" to-day.

July 8th.—Common-battery switchboard, for the P.M.G.'s Department. See "Official Notices" to-day.

July 8th.—Rubber-covered wire, batteries, telephone switchboards, measuring instruments and telephone instruments, for the P.M.G. See "Official Notices" to-day.

Tasmania.—June 9th. Telegraph and telephone material for the P.M.G.'s Department. See "Official Notices" May 9th.

Queensland—August 27th. Five sections of common-battery multiple switchboard, for the P.M.G.'s Department. See "Official Notices" to-day.

September 10th.—Nine sections of trunk line switchboard, for the P.M.G. See "Official Notices" to-day.

Western Australia.—May 28th. Condensing plant, pump and piping, for a Government power station at Perth. See "Official Notices" May 9th.

July 9th and 30th and August 6th.—Telegraph and telephone material, for the P.M.G.'s Department. See "Official Notices" to-day.

June 11th. Metal-filament lamps, for the P.M.G. See "Official Notices" to-day.

July 23rd.—Telegraph and telephone instruments, for the P.M.G. See "Official Notices" to-day.

July 23rd.—Telephone switchboards and parts, for the P.M.G. See "Official Notices" to-day.

July 30th.—Cable switchboard, for the P.M.G. See "Official Notices" to-day.

PERTH, W.A..—CORRECTION.—In our last issue, in our advertisements, by a printer's error, we gave the closing date for the item "Metal-filament Lamps, Schedule 274," as July 11th. This should have read June 11th. Will tenderers please note?

SOUTH AUSTRALIA.—July 16th. Telegraph and telephone material, for the P.M.G.'s Department. See "Official Notices" to-day.

NEW SOUTH WALES.—July 9th. Switchboards, for the P.M.G. See "Official Notices" to-day.

Bedford.—June 20th. About 10,870 tons of hard or soft coal, for the Corporation electricity works. Mr. Charles Stimson, town clerk.

Colchester.—May 27th. Steam coal for a year (about 5,000 tons) for the Corporation Electricity Department. Mr. W. Frisby, Borough Electrical Engineer, 36, Osborne Street.

Croydon.—May 29th. Electric lighting of the fire station and library, Thornton Heath, for the Corporation. See "Official Notices" May 16th.

Derby.—May 23rd. One 750-KW. motor-alternator, for the Corporation. See "Official Notices" May 9th.

Devonport.—June 2nd. Cables, wires and meters for 12 months for the Corporation. See "Official Notices" to-day.

Dundee.—May 30th. Steam and feed piping, steam feed pumps and hot-well tank, &c., for the Corporation Electricity Department. See "Official Notices" May 16th.

France.—June 5th. The French State Railway authorities (Service Electrique, l'Division), 43, Rue de Rome, Paris, are inviting tenders for a number of electric tractors for working the engine turntables at the various railway stations on the system.

Glasgow.—May 26th. Two steam turbo-alternators, with condensing plant (5,000 KW. and 2,000 KW. respectively), for the Corporation Tramways Department. See "Official Notices" April 25th.

Halifax.—June 6th. One natural draught chimney type water cooling tower, for the Electricity Department. See "Official Notices" to-day.

Hoylake and West Kirby.—May 27th. Coal (3,000 tons washed peas or slack) for the U.D.C. electricity works for a year. Mr. Chas. J. Turner, electrical engineer.

Hungary.—May 28th. The municipal authorities of Aranyosmarot are inviting tenders for the establishment of a central electric lighting station in the town.

London.—L.C.C.—May 28th. Electrical installations at Lewisham Bridge and Fairfield Road (Bow) elementary schools. See "Official Notices" May 9th.

June 3rd.—High and low-tension cables for Tramways Department. See "Official Notices" to-day.

METROPOLITAN ASYLUMS BOARD.—June 4th. Extension of internal telephone system and installation of signal bells at the Western Fever Hospital, Fulham, S.W. See "Official Notices" May 16th.

ST. PANCRAS.—June 9th. Welsh and other steam coal for the Electricity Department. Apply E.L. Department, 57, Pratt Street, N.W.

Mexborough.—May 30th. Lancashire boiler, for the U.D.C. Electricity Department. See "Official Notices" April 25th.

Oldham.—May 31st. Extra-high-tension switchboard for the Corporation. See "Official Notices" to-day.

Portsmouth.—June 11th. Wiring for electric light installation at Workhouse Infirmary extensions, &c., Milton. See "Official Notices" May 16th.

Rawtenstall.—June 10th. One 1,500-KW. turbo-alternator complete with condenser, for the Corporation. See "Official Notices" to-day.

Rotherham.—The question of renewing and doubling the tramway track in Fitzwilliam Road is under consideration. Tenders are invited for the supply of rails required in connection with the renewal of the tramway track in High Street.

Salford.—Wiring of new secondary school, Pendleton, for the Education Committee. See "Official Notices" May 16th.

Spain.—The municipal authorities of San Juan de Palamos (province of Gerona) have just invited tenders for the concession for the electric lighting of the town during a period of ten years.

The *Times* of 16th inst. contains lengthy advertisements intimating to "foreign manufacturers" that they are invited to tender for the establishment of certain wireless telegraph stations in Spain.

Swansea.—June 6th. Installation of electric light and bells at the new training college, Glanmor, for the Education Committee. See "Official Notices" to-day.

Walthamstow.—May 28th. Natural draught cooling tower, for the U.D.C. Electricity Department. See "Official Notices" May 2nd.

CLOSED.

Admiralty.—The Admiralty has recently accepted a tender from the Dussek Bitumen Co. for "Trinidite" compound for use in H.M. battleships, dockyards, &c.

Ashton-under-Lyne.—The Corporation has accepted the tender of the Bastian Meter Co., Ltd., for the supply of 10 ampere-meters.

Ashton-under-Lyne and Lowestoft.—Messrs. Chamberlain & Hookham, Ltd., have received the contract for two-rate meters from Ashton-under-Lyne, and also the contract for car meters from Lowestoft.

Barrow-in-Furness.—The T.C. has accepted the tender of Messrs. Drake for stoking plant, at £4,100, and for a generating plant, including gas engine, at £550.

Bedford.—The T.C. has accepted the following tenders:—

British Thomson-Houston Co., Ltd.—125 meters.
British Westinghouse Co., Ltd.—25 meters.
Dick, Kerr & Co., Ltd.—Lamps (one year).
Siemens Bros. & Co., Ltd.—Cables.

Belgium.—Twelve concerns—five German, four Belgian, two French and one Austrian—last week submitted tenders to the Belgian Telegraph Authorities in Brussels for the supply of 1,200 metres of sub-river cable and 240 metres of submarine cable. The lowest offer was that of the Rheydt Kabelfabrik, of Rheydt, Germany.

Bishopstawton (Devon).—Messrs. Thomas & Son, of Bishopstawton, have received, through Messrs. Lord & Shand, electrical engineers, of Plymouth, an order for supplying and fixing a Blackstone oil engine for an electric light installation at the Hall for Mr. C. H. Chichester, at Bishopstawton.

Bolton.—The contract for installing electric light at St. Margaret's new church has been let to the Bolton Corporation Electric Fittings Department.

Burnley.—The E.C. has accepted the following tenders:—

British Thomson-Houston Co.—Supply of motors and starters required by the department for the ensuing year.
Superheater Units, Ltd.—Supply of two superheaters.

Farnborough (Hants.).—The U.D.C. has accepted the tender of Messrs. Hughes & Stirling, Ltd., for a refuse destructor, at £2,006.

Glasgow.—A contract has been placed with Messrs. E. Bennis & Co., Ltd., for four Bennis chain-grate stokers, each 8 ft. wide, for the Corporation electric tramway station.

Government Contracts.—The following tenders have been accepted during the past month by the Government Departments named:—

WAR OFFICE.

Electric cells (parts).—Atlas Carbon and Battery Co., Ltd.; J. C. Fuller and Son, Ltd.; I.-R., G.-P. and Telegraph Works Co., Ltd.; Siemens Bros. and Co., Ltd.
Telephones, &c.—Automatic Telephone Manufacturing Co., Ltd.; British L.M. Ericsson Manufacturing Co., Ltd.; Spagnoletti, Ltd.

INDIA OFFICE: STORE DEPARTMENT.

Wireless apparatus.—Marconi's Wireless Telegraph Co.
Cable.—W. T. Henley's Telegraph Works Co.
Insulator cups.—Taylor, Tunnicliff & Co.; Bullers, Ltd.

CROWN AGENTS FOR THE COLONIES.

Battery material.—Siemens Bros. & Co., Ltd.
Insulated cable.—Callender's Cable and Construction Co., Ltd.
Telephone cable.—B.I. & Helsby Cables, Ltd.
Insulators.—Bullers, Ltd.
Telegraph poles.—J. Spencer, Ltd.; Siemens Bros. & Co., Ltd.
Telephone switchboards, &c.—Siemens Bros. & Co., Ltd.

POST OFFICE.

Telephonic apparatus.—Automatic Telephone Manufacturing Co., Ltd.; British L.M. Ericsson Manufacturing Co., Ltd.; Gent & Co., Ltd.; Peel-Conner Telephone Works, Ltd.; Western Electric Co., Ltd.
Silence cabinets.—M. Hunter & Sons.
Telegraphic cable.—Callender's Cable Co., Ltd.
Telephonic cable.—B.I. and Helsby Cables, Ltd.; Callender's Cable Co., Ltd.; Connolly Bros., Ltd.; Western Electric Co., Ltd.
Stoneware ducts.—Albion Clay Co., Ltd.
Insulators.—Bullers, Ltd.; Doulton & Co., Ltd.; Taylor, Tunnicliff and Co., Ltd.
Telegraphic ironwork.—Bullers, Ltd.; T. W. Lench, Ltd.
Cable distribution plugs.—Siemens Bros. & Co., Ltd.
Copper wire.—T. Bolton & Sons, Ltd.; B.I. and Helsby Cables, Ltd.; Elliott's Metal Co., Ltd.; R. Johnson & Nephew, Ltd.; Shropshire Iron Co., Ltd.; F. Smith & Co. (inc. in the London Electric Wire Co. and Smiths, Ltd.); J. Wilkes, Sons & Mapplebeck, Ltd.
Copper-covered wire.—Union Cable Co., Ltd.
Electric light plant at Waterford P.O.—Johnson & Phillips, Ltd.
Power plant, &c.—St. Just's Wireless Station, Cornwall.—Edmundsons' Electricity Corporation, Ltd.
Telephone exchange equipment at Llanelly, Kingston Exchange Extension and Information Desk, Hampstead.—Western Electric Co., Ltd.

H.M. OFFICE OF WORKS.

Lift at H.M. Stationery Office.—Aldous & Campbell, Ltd.

Great Yarmouth.—The T.C. has accepted the tender of Messrs. Myers, Rose & Co. for 2,000 tons of hard steam coal for the electricity works, at 17s. 6d. per ton, f.o.r., and that of Messrs. E. Foster & Co. for 1,000 tons of slack, at 14s. 5d. per ton.

Hastings.—The T.C. has accepted the offer of the Main Colliery Co., Ltd., for a further supply of from 3,500 to 4,000 tons of Welsh through-and-through smokeless steam coal.

Ilford.—Subject to the approval of the L.G.B., the U.D.C. has accepted the tender of Messrs. Heenan & Froude, Ltd., for a refuse destructor, at £12,065.

Ipswich.—The T.C. has accepted the tender of Messrs. Cocksedge & Co. for constructional steel work and roofing for extensions to the tramway car shed, at £605.

Leeds.—The following tenders have been accepted by the Corporation :—

British Westinghouse Elec. Co., Ltd.—Two 1,500-KW. rotary converters for Crown Point Station, at £5,295 each.
Electro-Mechanical Brake Co., Ltd.—50 new type section insulators, at 3²s. each.
British Thomson-Houston Co., Ltd.—Three-phase sub-station switchgear, as required, up to a total of 12 sets, at £45 15s. per set.
British Electric Transformer Co., Ltd.—Two sets of two to three-phase transformers, at £628 per set.
Waygoods, Ltd.—Electric passenger lift at Central Entrance to Market Hall, at £862.

Lincoln.—For the Corporation electricity station, Messrs. Bennis & Co., Ltd., are to supply two of their chain-grate stokers, 5 ft. 4⅛ in. wide × 9 ft. 2 in. long.

The tender of Messrs. George Robson & Co. has been accepted for coal elevating and conveying plant for the electricity works.

Manchester.—The Corporation has placed a contract for fitting Bennis-Miller-Bennett new chain-grate links to the frame of a chain-grate already installed at the electricity works, with Messrs. E. Bennis & Co., Ltd.

Rotherham.—The T.C. has accepted the tender of the Daimler Co., Ltd., for the supply of three motor-omnibuses for the Tramway Department, at £822 per 'bus.

Portsmouth.—The T.C. has accepted the tender of Mr. John Griffiths for small coal for the tramway undertaking, at 19s. 1d. per ton.

Sunderland.—The Cable Accessories Co., Ltd., have just secured a contract with the Corporation to supply a further 100 street lighting brackets and fittings.

Walsall.—The Electricity Committee of the T.C. has accepted the tender of Messrs. E. Green & Son for an economiser, at £623.

Wednesbury.—The Mechanical and Electrical Engineering Co.'s head office, Walsall, has secured the contract for the electrical equipment of the Metallurgical Schools at Wednesbury, for the Staffordshire Education Committee.

Wolverhampton.—The Corporation has accepted the following tenders :—

British Westinghouse Co.—Four converters, at £2,950.
Electric Construction Co., Ltd.—Two switchboards for sub-stations, at £408 and £209 respectively.
Reyrolle & Co., Ltd.—Extra-high-tension switchgear for Commercial Road station, at £2,000.
The Lorain Steel Co.—Special work, £1,128.

Worthing.—The Corporation contract for additional cells required for the extension of the storage battery at the electricity works, has been placed with the Hart Accumulator Co., Ltd.

FORTHCOMING EVENTS.

Junior Institution of Engineers.—Friday, May 23rd. At 89, Victoria Street, S.W. Discussion on "The Organisation of an Engineers' Employment Bureau," introduced by Mr. S. M. Hills.

Royal Institution of Great Britain.—Friday, May 23rd. At 9 p.m. Discourse on "The Secret of the Permanent Magnet, by Prof. S. P. Thompson.
Saturday, May 24th. At 3 p.m. Lecture on "Radioactivity: the Alpha Rays and their Connection with the Transformations," by Prof. E. Rutherford.
Thursday, May 29th. At 3 p.m. Lecture on "Recent Chemical Advances; Chemistry in Space," by Prof. W. J. Pope.
Saturday, May 31st. At 3 p.m. Lecture on "Radioactivity; The Origin of the Beta and Gamma Rays and the Connection Between Them," by Prof. E. Rutherford.

Institution of Electrical Engineers.—Friday, May 30th. At 8 p.m. Annual General Meeting. Paper on "Practical Application of Telephone Transmission Calculations" by Mr. A. J. Aldridge.

Physical Society.—Friday, May 30th. At 5 p.m. At the Imperial College of Science, South Kensington, S.W. Paper on "Electro-Thermal Phenomena at the Contact of two Conductors with a Theory of a Class of Radio-Telegraph Detectors," by Dr. W. H. Eccles.

The Question of Sunday Labour.—The Electricity Committee of Hammersmith B.C. has decided that, in the case of all employés whose duty necessitates Sunday work, arrangements be made to give them one whole day's holiday per week. Also that the wages of employés be increased, fitters and turners in future to be paid at the rate of 9½ per hour, and labourers, fitters' mates, and blacksmiths' mates at the rate of 7d. per hour.

THE ELECTRICAL ENGINEERS
(LONDON DIVISION).

Commanding Officer—LIEUT.-COL. H. M. LEAF.

The following orders have been issued for the current week :—

Monday, May 26th.—"A" Company. Infantry drill, 7 to 9 p.m.; technical instruction for all members on the 6th rate, and for all candidates for higher rating, 7 to 9 p.m.; musketry instruction, 9 to 10 p.m.

Tuesday, May 27th.—"B" Company. As for "A" Company.

Wednesday, May 28th.—All Companies. Annual course of musketry at Purfleet rifle ranges. Railway tickets will be sent to those notifying headquarters of their intention to attend.

Thursday, May 29th.—"C" Company. As for "A" Company.

Friday, May 30th.—"D" Company. Ditto.

Saturday, May 31st.—Annual course of musketry for all Companies at Purfleet rifle ranges.
Members are reminded that this is the last date on which they can fire their annual course to make themselves efficient, and should apply early for their railway tickets.
Headquarters will be opened for regimental business from 10 a.m. to 12 noon.

(Signed) P. H. CAMPBELL, Capt. R.E., and Adjt.
For Officer commanding L.E.E.

THE I.E.E. VISIT TO PARIS.

[SPECIAL DISPATCH.]

PARIS, Thursday morning.

THE party of members of the Institution of Electrical Engineers which is now here for the joint meeting with the Société Internationale des Electriciens, numbers 150, including ladies. The journey from London was a pleasant one, at the end of which members distributed themselves at various hotels.

On Wednesday morning, in glorious weather, President Berthelot opened the Congress at 9.30 o'clock at the Conservatoire des Arts et Métiers. One section of the party then proceeded to explore the Conservatoire Museum, while the remainder discussed six papers on electric traction, of which the titles and authors were given in our issue of May 9th, page 767, the speakers being Messrs. Mazin, Roger Smith, Hammond and Bochet. In the afternoon, part of the company went down the Seine by steamboat to Sevres porcelain factory, the excursion proving delightful in every way; another company visited the magnificent works at Saint Denis of the Société d'Electricité de Paris, with its 120,000 KW. of plant, also the works of the Triphasé Co. at Asniéres. In the evening of Wednesday the banquet given by the Société was held at the Palais d'Orsay, covers being laid for 360. Speeches of considerable interest were delivered by M. Berthelot and Mr. Duddell, and an excellent entertainment was afforded, the principal feature calling for mention being a cinematograph demonstration with Gaumont speaking films; notèd artistes also took part.

This (Thursday) morning the Congress was resumed, with M. Marcel Deprés in the chair, the papers by Mr. J. S. Highfield and M. H. Leblanc on long-distance transmission receiving attention; visits are arranged for this afternoon.

To-morrow there will be a reception at the top of Eiffel Tower, with Mr. Duddell as chairman.

Appointments Vacant.—Head of Electrical Engineering Department, Birmingham Municipal Technical School (£300); lecturer in mechanical and electrical engineering at the Municipal Technical Institute, Belfast (£180); fitter-driver, for Severalls Asylum, Colchester (35s.); electrical engineer (£200) for the Aylesbury U.D.C.; assistant for sales department (£130), chief representative in publicity department (£130), and engineering representative in publicity department (£117), for the Sheffield Corporation. See our advertisement pages in this issue.

Athletic Sports.—The fifth annual athletic sports and Corps Championships and inter-company competitions for the "Le Rossignol" challenge cup of the London Electrical Engineers (Territorial Force) were held on Wednesday evening at Stamford Bridge Athletic Grounds, Fulham Road, S.W.

Accident.—It is reported that in a collision between two motor-cars at Aberdeen last Saturday night, William Ross, a "foreman electrician," who was in one of the cars, was seriously injured.

NOTES.

A Forecast.—Is it a fact, or have I dreamt it, that, by means of electricity, the world of matter has become a great nerve, vibrating thousands of miles in a breathless point of time.—Nathaniel Hawthorne—*The House of the Seven Gables.*

Wanted—Six Hundred Pounds.—Our readers are already aware that at the annual festival dinner Mr. E. G. Byng offered to give £100 to the funds of the Electrical Trades Benevolent Institution, if nine other firms or gentlemen would do the same within three months from April 16th. The £100 which Mr. Sutton had already given was to be counted as one of the nine; Mr. H. Hirst, through Mr. Sutton, promised a like amount; and Mr. Garcke's promise brings the total up to £400 out of the required £1,000.

It has been thought that some of our generously disposed readers would be willing to follow the splendid example set by these gentlemen and ensure that the conditional offers are fulfilled by making or influencing six other offers. We hope that in later issues it will be possible for us to fill names into the six spaces now standing vacant below:—

1	Mr. E. G. Byng	£100
2	Mr. G. Sutton	£100
3	Mr. H. Hirst	£100
4	Mr. E. Garcke	£100
5	*	
6	*	
7	*	
8	*	
9	*	
10	*	

Discharging Electricity from Paper, &c.—A recent patent granted to Messrs. Siemens Bros. & Co. (No. 1,554 of 1912) describes a method of discharging the static electricity evolved in spinning and weaving, or in paper manufacture, by ionising the atmosphere between the charged material and an earthed electrode, by means of ultra-violet rays, produced by an arc between iron electrodes or by a mercury-in-quartz lamp. The use of radio-active substances for producing the ionisation is also discussed (in Patent No. 1,555).

Institution and Lecture Notes.—Institution of Electrical Engineers.—The report of the Council for the year 1912-13 shows that at May 1st, 1913, the total membership numbered 7,084, a net increase during the year of 547, compared with an average of 137 for the preceding five years. In view of the change in the articles of association which took place during the year, it may be interesting to give in detail the changes in the list of members:—

	Hon. Mem.	Mem.	Assoc. Mem.	Assoc.	Grad.	Stu.	Totals
Totals at May 1st, 1912 ..	7	1,388	3,089	806	—	1,247	6,537
Additions during year:—							
Elected	—	45	409	27	164	256	901
Reinstated	—	1	3	5	—	27	36
Transferred to	—	169	268	4	96	—	537
Total additions for 1912-13 ..	—	215	680	36	260	283	1,474
Deductions during year:—							
Deceased	—	15	5	4	—	5	29
Resigned	—	21	36	53	—	57	167
Lapsed	—	18	49	10	—	117	194
Transferred from ..	—	—	144	104	—	289	537
Total deductions for 1912-13	—	54	234	171	—	468	927
Totals at May 1st, 1913 ..	7	1,549	3,535	671	260	1,062	547 7,084

During the session there were 14 general meetings and 61 meetings of Local Sections. Some 200 members took part in the summer meeting at Glasgow.

It is announced, in accordance with the statement which we have already published, that the *Journal* will be issued fortnightly from December to July, and will be of quarto size; in addition to the papers and discussions now published in the *Journal*, it will contain notices of meetings and other communications from the Council to the members.

Particulars are given of the facilities for experimental demonstrations which are now available in the lecture theatre, including gas, water, and various electrical supplies.

Arrangements have been made for the interchange of the privileges of membership with the American Institute of Electrical Engineers.

Provision has been made for the organisation of research to prevent overlapping and to promote research in selected subjects.

The Institution has joined with other British and American engineering societies in raising a sum of £1,650 for a memorial window to Lord Kelvin in Westminster Abbey, which will be completed by the end of June.

The Benevolent Fund at the end of December amounted to £4,642.

The accounts are presented in a new form, showing more clearly than before the margin to the good on the year's working, which last year amounted to £1,238, a decrease of £365 as compared with the previous year. The mortgages had been reduced by £652 from £36,274 to £35,622. The assets amounted to £110,368 against liabilities of £45,151, leaving a balance of £65,217, an improvement on last year of £2,813.

The formation of a lending library has been sanctioned by the Council, and progress is being made with the organisation of the museum.

I.E.E. (Students' Section).—The report of the Committee for the Session 1912-13 states that in London the average attendance at the 11 meetings has been about 36, the highest recorded being 51. At Manchester there were eight meetings, with 38 average attendances, and at Glasgow five meetings, with 15 average attendances. At Newcastle nine meetings were held. It was decided not to hold a summer tour last year. Arrangements are, however, being made to hold a tour this year from July 2nd until July 5th in Newcastle and the district.

I.E.E. (Yorkshire Local Section).—At the annual meeting of the Section, held at Leeds on the 14th inst., the following officers were elected:—Chairman, Mr. W. B. Woodhouse; vice-chairmen, Mr. H. H Wright and Dr. R. Pohl; hon. secretary, Mr. Jno. D. Bailie; for the four vacancies on the Committee, Messrs. W. M. Rogerson, H. A. Nevill, W. Lang, and F. J. Lowe were elected.

I.E.E. (Scottish Local Section).—This Section has arranged to hold its annual summer outing, on Tuesday, June 17th. The party will leave Central (Low Level) Station, at 11.9 a.m., and lunch will be provided at the Inversnaid Hotel, at 2 p.m. On the return journey, the steamer will leave Inversnaid at 6.45 p.m., a substantial tea being served on board. Members so desiring will be shown over the works of the Glasgow Corporation water department, at Loch Arklet.

Junior Institution of Engineers.—On the twenty-ninth anniversary of the foundation of this Institution, on Monday, June 30th, at the Institution of Electrical Engineers, Victoria Embankment, the second Gustave Canet Lecture will be delivered by Dr. Dugald Clerk, F.R.S., who has chosen as his subject "The Working Fluid of Internal Combustion Engines." The late M. Gustave Canet (past president of the Institution of Civil Engineers of France) was president of the Junior Institution of Engineers in 1907-8, his death occurring at the close of his term of office. In accordance with a wish he had expressed, Madame Canet, MM. Paul and Albert Canet, and their families, presented a sum of money to the Institution to form a Gold Medal, in commemoration of his presidency. This Gold Medal is awarded quadrennially to an officer or Member of the Institution invited by the Council to deliver a lecture on the subject of importance to the engineering and scientific world. The first award was made in 1909, the lecture on "The Engineering of Ordnance" being delivered by Lieut. (now Sir) A. Trevor Dawson, R.N., M.Inst.C.E., M.I.Mech.E. president of the Institution 1912-13), who will preside on the occasion of Dr. Dugald Clerk's lecture.

Institution of Mining Engineers.—The general meeting will be held in London (Burlington House) on Thursday, June 5th. Among the papers to come under consideration is one by Mr. B. Welbourn on "Insulated and Bare Copper and Aluminium Cables for the Transmission of Electrical Energy, with Special Reference to Mining Work." Members are invited to attend the Mining Machinery Exhibition at the Agricultural Hall, Islington, after the general meeting. At night the Institution dinner will be held at the Waldorf Hotel. Friday will be devoted to an excursion to the Chingford Reservoir.

Association of Mining Electrical Engineers (West of Scotland Branch).—The annual business meeting of this Branch was held last Friday in the Royal Technical College, Glasgow. Mr. Matthew Brown, general manager of the Banknock Coal Co., presided. It was reported that the Branch was continuing to make gratifying progress both numerically and financially. Office-bearers were elected for the ensuing session, as follows:—President, Mr. Matthew Brown; vice-president, Mr. A. B. Muirhead, Lenzie; secretary, Mr. David Martin, 45, Hope Street, Glasgow; and treasurer, Mr. D. Landale Frew, Glasgow. It was announced that arrangements were being made for a joint excursion with the Scottish Branch of the National Association of Colliery Managers.

American Society of Mechanical Engineers.—The spring meeting of this Society has been held at Baltimore this week, from May 20th to 23rd. Among the papers coming under attention were the following:—"Cost of Upkeep of Horse-drawn Vehicles against Electric Vehicles," by W. R. Metz; "Present Operation of Gas Engines using Blast Furnace Gas as Fuel," by C. C. Sampson.

A Novel Shooting Match on the Life Target.—On Monday last, a team composed of various members of the Electrical Press, was defeated at a shooting competition by a team of precision marksmen from Messrs. Siemens Bros. Yet the Press men were not altogether to blame, for it is the characteristic of the Press representative that he never sheds his journalistic instinct, and it was hardly to be expected that he should give his undivided attention to beads and barnacles and the like when it is explained that this shoot took place in the private range of Messrs. Life Targets, Ltd., at 12, Bow Street, W.C., the company that is handling the interesting kinematograph target that has already been described in these columns. This shoot was doubly interesting in that it constituted the first animated target competition that has been held as yet, and afforded a most interesting contrast between the methods and achievements of the peep-sight school of bull's-eye marksmen and the open-sight snap-shooting school. The shoot in question started with ordinary bull's-eye targets, the indicating or marking device only of the Life Target system being employed, and subsequently each man was confronted with an animated picture of a leaping springbok, at which he had to fire his dozen rounds from a Winchester repeater in under a minute. Modern warfare will undoubtedly call for quick, accurate sharp shooting, and the results of this shoot gave one furiously to think that trained men, who can do so well with a bull's-eye target, miss so

often at running game. For the benefit of our readers, and at the risk of repetition, we would explain that in the life-target system one fires at an animated picture, and at the instant of firing this stops dead, and one is able to see the result of one's effort, be it hit or miss, by virtue of a small point of light, which is caused by the bullet piercing the screen and allowing a strong light that is behind it to penetrate the hole. After about one-third of a second this hole is automatically closed, and the picture resumes motion ready for the next shot. Mr. D. C. M. Hume, A.M.I.E.E., who, on behalf of the company, placed the range at the disposal of the teams, and explained the technical workings of the system, told us that from his point of view the competition constituted a most interesting object lesson in support of the very claims and arguments the company are daily advancing as to the real necessity, as well as attractiveness, of life targets. Everybody went away full of the unusual and novel competition they had been privileged to take part in, not unconscious of the fact that they were the pioneers of inter-team shooting on the new target.

The I.M.E.A. Meeting.—The official programme of the convention to be held in London on June 17th, 18th, 19th, 20th and 21st, has now been issued, and follows closely the preliminary announcement given on page 565 of our issue of April 4th. At the Wednesday meeting, open to members and delegates only, the subjects for discussion are the "I.M.E.A. Bill," and "Heating and Cooking." On Thursday the special train to Kingston leaves at 9.30 a.m., and the meeting commences at 10.15, these times being earlier than originally announced.

We note with satisfaction that a demonstration of battery-driven vehicles will be given after this meeting, at which a paper on "Electric Vehicles" is being read. We also notice that the hoped-for visit to the Chingford pumping station, to see the Humphrey pumps installed there, has been arranged for, the time of departure from the I.E.E. being 9 30 a.m. All the London excursions start from the I.E.E., where also an exhibit of cooking, heating and other electrical appliances will be held during the Convention. Tickets for the various functions must be obtained *in advance* from the Secretary, 28, Bedford Square, W.C.

For Sale.—The L.C.C. invites tenders for the purchase of two 3,500-KW. steam alternators and two 150-KW. Belliss sets. See our advertisement pages in this issue.

Fatality.—A correspondent says that at Oakbank Oil-works, West Calder, Mr. Thomas Pentherer, foreman plumber, was killed by coming in contact with a live electric wire.

Copper.—Mid-monthly returns (May 15th), as set forth in Messrs. H. R. Merton & Co.'s statistical circular, show increased activity in the market for this metal. That the visible supplies still stand at 30,243 tons, being a decrease of only 194 tons on the quantity for the end of April is apparently due to the increase in French stocks of 794 tons, English stocks having decreased by 588 tons, and the quantity afloat by 400 tons. Total European stocks, including Rotterdam, Hamburg, and Bremen, are less by 1,127 tons, and the estimate for other European ports reckons them as holding 400 tons less than for April 30th. European arrivals from North America are strong at 23.059 tons. England and France from Spain and Portugal receive only 308 tons, but from other countries well above the average quantity. Shipments from Chile show small, and Australia under the average. The total deliveries, at 30,052 tons for the half-month, are distinctly high. American stocks for the end of April were 12,822 tons less than for the end of March—a large reduction. The total visible supply, including Holland and Germany, stood at 77,556 tons for April 30th, a reduction of 14,068 tons for the month, a reduction not equalled, or approached, since May, 1912, during which month stocks were lowered 14,199 tons.

Old Centralians.—A lawn tennis match between the Old Centralians' Tennis Team and the City and Guilds (Engineering) College Lawn Tennis Club, was played on Saturday at the latter club's ground, North Ealing. The Old Students were beaten by 5-4. The score was as follows:—

Regnard (Capt.) and Saurback lost to R. Burton (Capt.) and H. T. M. Kent, 3-6, 7-5, 4-6; beat J. V. and P. V. Dupré, 2-6, 6-2, 6-4; beat A. P. Dicksee and R. A. Mack, 6-1, 6-1.

Harris and Moore beat Burton and Kent, 6-2, 7-5; lost to J. V. and P. V. Dupré, 1-6, 2-6; beat Dicksee and Mack, 6-1, 6-3.

Ryan and Manuel lost to Burton and Kent, 3-6, 1-6; lost to J. V. and P. V. Dupré, 0-6, 4-6; beat Dicksee and Mack, 6-2, 6-3.

A return match will be played on June 7th.

Old Students of the College who are good tennis players are requested to communicate with the Match Captain (Mr. Richard Burton, c/o Messrs. C. W. Burton Griffiths & Co., 1-3, Ludgate Square, Ludgate Hill, E.C.)

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*]

Central Station Officials.—The Whitehaven T.C. on May 14th discussed a recommendation that instead of receiving an increased salary, the electrical engineer (MR. B. SANKEY) should be paid a bonus on the trade profits of the undertaking, the exact basis on which to calculate the bonus to be considered by a Sub-Committee. Mr. W. Hinde said it would be an injustice to Mr. Sankey to pass the recommendation, as there could be no profit for a couple of years until the deficit of £1,598 was wiped out; he hoped that Mr. Sankey would have an increase before two years' time. Other members took the same view, and the matter was referred back to the Water and Lighting Committee for re-consideration.

The Watford U.D.C. has appointed MR. CHAS. E. D. GREENHALGH, of the Malvern U.D.C. electricity staff, as chief assistant electrical engineer.

The General Purposes Committee of Norwich T.C. has recommended that the salary of MR. F. M. LONG, city electrical engineer, be increased from £600 to £700 a year.

MR. WILLIAM TRAVIS, having accepted another appointment, his resignation of the post of chief assistant electrical engineer has been accepted by the Hastings Corporation. The vacancy has been filled by the appointment of MR. A. J. RYAN (assistant electrical engineer at Gillingham). The salary is £150, rising by annual increments of £10 to £180 per annum.

MR. G. P. SHALLCROSS has been appointed Corporation electrical engineer at Birkenhead.

A Nottingham paper says that MR. F. H. COMFORT, who for the past ten years has been the mains superintendent of the Nottingham Corporation's electric lighting department, is going abroad permanently. Mr. Comfort, before serving under the Corporation, was for 22 years with the National Telephone Co., and for a time was their chief inspector.

MR. R. J. COULSON BRYANT has resigned his position at Portland Dockyard power station to take up the post of shift engineer at the Lowestoft Corporation electricity works.

The Worcester T.C. has promoted MR. H. H. SMITH to the position of works superintendent at the electricity works, at a salary of £150.

MR. FRANK TIMMS, of Newcastle, has been appointed installation engineer to the Tynemouth municipal undertaking.

At the fifth annual general meeting of the Barrow and District Association of Engineers, held on Monday last, MR. H. R. BURNETT, electrical engineer to the Barrow Corporation, was re-elected president.

Tramway Officials.—The tramway staff and employés at Croydon have presented an 18-carat gold hunter watch and a jewelled and gold stud to MR. H. B. HARRIS, who recently resigned the post of tramways engineer to the Corporation.

General.—The *Times* states that the President of the Local Government Board has appointed MR. H. H. LAW, M.Inst.C.E., as chief engineering inspector to the board, in succession to Mr. George Waller Willcock. C.B., retired.

ALD. JAS. HENRY ASTON, chairman of the Borough Tramways Committee at Huddersfield, has been appointed a Justice of the Peace for the borough.

It is stated that DR. GISBERT KAPP will be President of Section G (Engineering) at this year's meeting of the B.A., Mr. Aspinall having had to withdraw owing to ill-health.

Congratulations to MR. J. C. DENISON DENISON-PENDER on his election to the House of Commons as the member for Newmarket. The new member is the son of Sir J. Denison-Pender and a grandson of the late Sir John Pender. He is only 31 years of age, but he goes to Westminster with a considerable knowledge of submarine telegraph matters. Not only is the name of Pender a household one in telegraph circles, but Mr. Denison-Pender has had personal and practical experience in submarine telegraph work, both in cable-laying operations and as a director of several well-known companies.

MR. F. R. BATTY has resigned his position as manager to Messrs. R. P. Hulton & Co., London, to take up a position in Manchester.

Obituary.—MR. HORATIO A. FOSTER.—We regret to read in the American *Electrical Review* of the death, which occurred suddenly one afternoon in April in a New York subway station, of Mr. H. A. Foster, who had been connected with electrical affairs in the States since 1884, having been associated with the Daft Electrical Co., the Thomson-Houston Electric Co., and the United States Census Office (electrical department). Twenty years ago he was editor of an American paper known as *Electrical Industries*, and he also became associated with Prof. George Forbes and the Niagara Falls Power Co. Later his power station and electric traction work brought him into close relation with L. B. Stillwell and B. J. Arnold, and in recent years he had devoted himself more to the valuation of public utilities and the study of traffic conditions. Many readers, doubtless, are familiar with Foster's Electrical Engineer's Pocket Book, of which he was the editor.

MR. J. G. FIEGEHEN.—The death occurred on May 11th, after several weeks' illness, of Mr. John George Fiegehen, founder and principal of the Bedford Engineering Co., crane makers, of Houghton Road, Bedford, a business he established about 26 years ago. He was 62 years of age.

PROF. HEINRICH WEBER.—The *Times* Berlin correspondent reports that Prof. Heinrich Weber, Ordinary Professor of Mathematics at Strassburg University since 1894, died on Saturday, aged 71 years.

MR. H. BROWN.—The death occurred on Sunday, after a brief illness, of Mr. Henry Brown, who was for many years on the staff at the Norwich Corporation electricity works. He was 65 years of age.

Will.—The late MR. W. M. MUSGRAVE, managing director of John Musgrave & Sons, Ltd., of Bolton, left £2,666 gross and £238 net personalty.

NEW COMPANIES REGISTERED.

Nitrogen Products and Carbide Co., Ltd. (128,982).—Registered May 15th, by A. Blackman, 194, Gresham House, Old Broad Street, E.C. Capital £2,000,000 in £1 shares. Objects: To acquire (1) from Nitrate Products, Ltd., the rights for the whole world where patents have been granted (except Rhineland and Westphalia) for the Ostwald Catalytic process for the production of nitric acid and nitrate of ammonia, together with works at Vilverde (Belgium) having a capacity of about 3,800 tons of nitrate ammonia per annum, and the business of that company as a going concern, with the benefit of subsisting contracts; (2) from Dettifoss Power Co., Ltd., the water-power in Iceland known as "Dettifoss," and which, when harnessed up, should be capable of generating about 410,000 E.H.P.; (3) options for the purchase of three water-powers in Norway, known as Aura, Toke and Bleskestad-Bratland, estimated to yield, when harnessed up, about 600,000 E.H.P., and which options the company intend to exercise; and (4) the whole of the share capital of Nitrogen Fertilisers, Ltd. (£220,000), whose works at Adda (Norway) and Alby (Sweden) are at present producing (under licence granted in 1912) about 40,000 tons of cyanamide per annum, to adopt agreements with the said companies, to carry on the business of artificial fertilisers, manufacturers of and dealers in carbides, cyanamides, nitrogen, nitric acid, sulphuric acid, ammonia, sulphate and nitrate of ammonia, cyanamides nitrolim (calcium cyanamide), sulphur, synthetic rubber and chemicals of all kinds, soaps, starches and other products, chemical manures and fertilising substances, electrical, gas and mechanical engineers, tool makers, founders, generators of power by means of water, heat, light, electricity or otherwise, &c. The signatories (with one share each) are:—S. H. Boileau, Sutherland House, Surbiton, manager; T. A. Day, 3, Heather Road, Grove Park, Lee, S.E., clerk; A. H. Barnett, 99, Woodside Gardens, Bruce Grove, N., clerk; G. W. Parsons, Hill View, Oakleigh Road, New Southgate, N., clerk; H. C. Maclure, 99, The Drive, Fulham Park Gardens, S.W., manager; J. C. Harley, Norbury, Sidcup, solicitor; M. A. Carson, 31, Princess Avenue, Alexandra Park, N., accountant. Minimum cash subscription, seven shares. The first directors (to number not less than two or more than nine) are A. E. Barton, 28, Charles Street, Berkeley Square, W., chairman (chairman, Alby United Carbide Factories, Ltd.); Albert Vickers, 14, Cadogan Square, W. (chairman, Vickers, Ltd.); Sir Richard D. Awdry, K.C.B., 65, Victoria Road, Kensington, W. (director, Nobel Dynamite Trust Co., Ltd.); Sir Vincent Caillard, 42, Half Moon Street, Piccadilly, W. (director, Vickers, Ltd.); C. H. Magniac, 33, Old Broad Street, E.C. (director, Alby United Carbide Factories, Ltd.); Major C. H. Campbell, Highwood House, Leominster (director, Nitrogen Fertilisers, Ltd.); and Dr. A. Petersson, Adda, Norway (local director, Alby United Carbide Factories, Ltd.); qualification (except first directors), £500; remuneration, £250 each per annum (chairman, £1,250) and 2½ per cent. per annum of the surplus net profits of the company after payment to the shareholders of a dividend of 10 per cent., divisible. Registered office, Winchester House, Old Broad Street, E.C.

H. Langdon Down, Ltd. (128,902).—This company was registered on May 9th, with a capital of £3,000 in £1 shares (1,000 "A" 7½ per cent. cumulative preference, 99 8"B" 10 per cent. cumulative preference and 2 ordinary), to carry on the business of manufacturers of and dealers in gas and electric fittings and apparatus, and appliances for lighting, extinguishing and controlling at a distance gas, electric or other illuminants, &c. The subscribers (with one share each) are:—H. L. Down, 39, Asmuns Place, Hendon, manager; T. B. Shilston, 46, Cameron Road, Ilford, engineer. Private company. The number of directors is not to be less than two or more than five; the first are H. L. Down (chairman), and T. P. Shilston (both permanent). Registered office, 115-117, Cannon Street, E.C.

Times Electric Co., Ltd. (128,964).—This company was registered on May 14th, with a capital of £3,000 in £1 shares, to carry on the business of manufacturers and dealers in electrical appliances and machinery, electrical and general engineers and contractors, builders, suppliers of electricity, &c. The subscribers (with one share each) are:—C. H. Patersen, 19, Thornton Road, Barnet, Herts, clerk; L. E. Tucker, 5, Noel Road, North Acton, W., clerk. Private company. The number of directors is not to be less than two or more than five; the subscribers are to appoint the first; remuneration, one guinea each per meeting attended (chairman, 10s. 6d. extra). Registered by C. R. Enever, Broad Street House, E.C.

Scientific Researches Co., Ltd. (128,910).—This company was registered on May 9th, with a capital of £150 in £1 shares, to promote scientific research and turn the same to account commercially, &c. The subscribers (with one share each) are:—E. Martin Harvey, 33, Lee Park, Blackheath, S.E., merchant; A. Poulter, 19, Finsbury Circus, E.C., company secretary. Private company. The number of directors is not to be more than five; the subscribers are to appoint the first. Registered office, 19, Finsbury Circus, E.C.

Kentish Town Motor and Electrical Engineering Co., Ltd. (128,927).—This company was registered on May 10th, with a capital of £750 in £1 shares, to carry on the business indicated by the title. The subscribers (with one share each) are:—F. Rosser, 31, Prince of Wales Road, Kentish Town, N.W.; E. Jackson, 13, Hadley Street, Kentish Town, N.W., clerk. Private company. The first directors are F. Rosser and E. Jackson. Registered office, 114, Kentish Town Road, N.W.

Cable Construction Syndicate, Ltd. (128,872).—This company was registered on May 8th, with a capital of £100 in £1 shares, to carry on the business indicated by the title. The subscribers (with one share each) are:—J. Storrs, Fern Bank, Stalybridge, builder and contractor; W. Gornall, Ellesmere Street, Bolton, contractor; J. Dolan, Napier Street, Warrington, builder; T. A. Locan, 23, Strutt Street, Manchester, managing director of a company; C. Locan, 23, Strutt Street, Manchester, managing director of a company. Private company. The first directors are J. Storrs, W. Gornall, J. Dolan, T. A. Locan, G. Locan and F. Woods; secretary, T. A. Locan. Registered office, 23, Strutt Street, Manchester.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Coast Development Corporation, Ltd.—Mortgage on electric lighting station at Walton-on-the-Naze, with plant and other fixtures used in connection therewith, beneficial interest and goodwill of business carried on thereat, electric lighting poles, cables, wires, &c., and benefit of Walton-on-the-Naze Electric Lighting Order, 1909, dated April 30th, 1913, to secure not more than £2,000, of which £1,550 is now advanced. Holders: Misses E. B., E. F., M. A., E. M. and G. B. Taylor, all of Grove Park, Bromley, Kent.

Faringdon Electric Light and Power Co., Ltd.—Particulars of £1,500 debs., created December 2nd, 1912, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the amount of the present issue being £100. Property charged: The company's undertaking and property, present and future, including uncalled capital. No trustees.

Albert Green, Ltd.—Particulars of £2,000 "B" debentures, created May 5th, 1913, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's undertaking and property, present and future, including uncalled capital. No trustees.

South London Electric Supply Corporation, Ltd.—Issue on April 15th, of £1,500, and on May 6th, 1913, of £1,771 debentures, parts of a series of which particulars have already been filed.

Transvaal Hydraulic Power Syndicate, Ltd.—A memorandum of satisfaction in full on April 26th, 1913, of debentures dated October 27th, 1911, securing £3,000, has been filed.

James Keith & Blackman Co., Ltd.—Issue on May 5th, 1913, of £270 debentures, part of a series of which particulars have already been filed.

Rawlings Bros., Ltd.—Mortgage and Land Registry Charge on certain land and premises in Pembroke Mews, Belgrave Square, W., both dated May 10th, 1913, to secure £10,000. Holders: Alliance Assurance Co., Ltd., 1, Bartholomew Lane, E.C.

Electrical Trades Supply, Ltd.—Particulars of £1,250 debentures, created May 9th, 1913, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's undertaking and property, present and future, including uncalled and unpaid capital. No trustees.

Silent Electric Clock Co., Ltd.—Particulars of £800 debentures, created May 5th, 1913, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's undertaking and property, present and future. No trustees.

CITY NOTES.

Sunderland District Electric Tramways, Ltd.

THE annual meeting was held at Winchester House, E.C., on Tuesday.

MR. H. R. HOGG, in moving the adoption of the report (see ELECTRICAL REVIEW, page 822), congratulated the shareholders on the fact that the property was now under their own management, as it was handed over by the Receiver the day after the date of the accounts. The scheme of arrangement with the prior lien and first mortgage debenture-holders was of such a nature that, while settling the claims on an equitable basis, it reduced the fixed charges to a point which should be covered without difficulty by the annual income, and leave a balance in hand for the interests which successively followed after. The outgoings had been under the control of the late Receiver for two years and five months; but as he was unable to spend any of the income on the renewal of cars, most of them were taken over in a very bad state. To remedy this, an order for 10 cars was put in hand at once, and these had been delivered and were now running, and a further six cars had since been ordered. The accounts under review had to allow for full interest on three sets of debentures, and this, with the expenses of the Receivership, increased the old balance to the debit of profit and loss by the sum of £1,175. For some months in the early part of the year the receipts were affected by a strike of colliers, but in the latter half of the year they did fairly well, and at the end the accounts showed a growth of traffic receipts of £649, or over 7 per cent. increase on those of the previous 12 months. During the 26 weeks which had elapsed since the closing of the books, the traffic net receipts had increased by £1,857 over the corresponding period of the previous year. Of course, as he had said, the previous period was affected by the strike, and during the present period there had been the reduction in the charges, but still there had been a continuous increase in the receipts from year to year. The building of houses along the line of route had been steadily increasing, which meant probably that the increase would continue in normal times. He might remind them of their position when the board resumed the control of the property. The cash accumulated by the Receiver amounted to £26,417, but provision had to be made for the payment of the old prior lien bonds, and £10,500 worth of these at 105 and interest brought the total to £11,462. Other debts, amounting to £6,735, had to be paid, making in all £18,197. Thus from that and the sale of 20,000 new prior lien bonds, the board had for the necessary improvement of the rolling stock and line just about £26,000. This would enable them to provide the necessary equipment and make improvements for the better working of the line and the saving of expenses. The standing charges, *i.e.*, the interests which had to be paid every half-year, were reduced to the interest on £140,000, as against the interest which previously had to be paid on £195,500. £40,000 of the first mortgage bonds and £20,000 second mortgage bonds, with the interest accrued during the receivership, had been replaced by bonds which only received interest if earned; but the prior lien bonds were increased by £9,500. He was sorry to say that the company from whom they obtained their power had been taken over by the debenture-holders and sold to another company, and thus they were obliged to make a new arrangement for the supply of current. They were not, perhaps, in such a good position for bargaining as they were at the beginning, but they would do their best to make a good bargain, because, if necessary, they could always erect their own generating station. The present balance-sheet was very complicated, because of the large amounts now standing to the debit of profit and loss, but by reducing the share capital and writing off these debit balances and other assets which were now only nominal ones, the whole thing could be simplified, and the board proposed to bring that before the shareholders at a later date.

MR. R. TAYLER seconded the motion.

Answering MR. DE PAIVA, the CHAIRMAN said the debentures were reduced to 75 per cent., and 25 per cent. was given to the debenture-holders in income bonds, which would only receive interest if it was earned.

Mr. De Paiva said he understood there was some arrangement come to with the income-tax people. The debenture-holders were to have this 25 per cent. allocated to them, but then there was some deduction made by arrangement with Somerset House.

The Chairman said the matter had not been settled.

Mr. De Paiva said he was an income-tax commissioner, and had had to deal several times with appeals by people who had had shares allotted to them representing arrears of dividends, and for which they said there was no market at all. They allowed an appeal like that, and Somerset House was pressing the company for cash they should refuse to pay.

The Chairman said the board had not paid anything so far, but they were discussing the matter.

Mr. De Paiva said the company should say to Somerset House, "These shares are of no value. If you value them at anything, will you buy them?"

The report was then adopted.

West Coast of America Telegraph Co., Ltd.

Sir J. Denison-Pender, K.C.M.G., presided on Tuesday at Electra House, E.C., over the sixteenth ordinary general meeting of the above company.

In moving the adoption of the report (see Electrical Review, p. 823), the Chairman said that the gross receipts for 1912 were £53,738, against £53,891, showing a decrease of £153, but when he pointed out that for the eight months of the year ending December, 1912, they were working at a reduced rate of something like 33 per cent. on the old rate—that was to say, a reduction from 3s 7d. a word to 2s. 9d.—he thought a decrease of only £150 was a very satisfactory item in the accounts. The working expenses for 1912 were practically the same as in 1911, showing a slight decrease of about £44. Salaries showed an increase of £1,090, rent and taxes an increase of £200, travelling expenses an increase of £265, and stationery an increase of £200. This was, of course, a considerable sum, but was counteracted by the cost of maintenance of cables and land lines, which in 1911 cost £14,300, and in 1912 only £12,162. Therefore, the £2,000 gained on this had gone towards the reduction of the general expenses. These had been carefully gone into, but it was impossible to work the company efficiently on less salaries, &c., which must increase with the increase of the traffic. The number of days on which the cable was down in 1912, when they lost traffic, was 23, as compared with 59 in 1911, which was also a satisfactory feature. A shareholder had written to him pointing out that the expenses of the company had nearly doubled in the last 15 years. This was perfectly true, but it was pretty much the same thing with every company, whether it was a cable or manufacturing company. The increase in expenses had been very large, because wages and the cost of materials had gone up, but at the same time they must not overlook the fact that the traffic during this period has also more than doubled. Another shareholder had written with regard to the future, and asked what difference the Panama Canal would make to them. That, of course, they could not say. At any rate, it would be made a new highway through Central America, and he could not see that it could do any harm to the West Coast of America. It certainly ought to develop that part, and, if anything, the company ought to benefit by the opening of the Canal. In conclusion, the Chairman proposed the adoption of the report, with the declaration of a dividend of 2½ per cent.

Sir Albert J. Leppoc Cappel seconded the motion, and it was carried.

A hearty vote of thanks was accorded the board and staff.

Eastern Extension, Australasian and China Telegraph Co., Ltd.

The half-yearly meeting was held on Tuesday at Electra House, E.C., Sir J. Wolfe Barry presiding.

In proposing the adoption of the report (see Electrical Review, p. 822), the Chairman said that the gross receipts for the half-year amounted to £379,000 against £359,000 in the corresponding six months of 1911; an increase of £20,000. Nearly £4,000 of that increase was derived from additional reserve fund investments, and the remainder (£16,000) was due to growth of traffic spread over the whole of the company's system. The working and other expenses amounted to £154,000, showing a decrease of £5,000, partly due to the expenses attending maintenance of cables having been nearly £2,000 less last year than in 1911, and partly to the general expenses of stations having been debited in 1911 with the cost of new relay and other apparatus, for which there was no corresponding item in the accounts for the past half-year. Comparing the figures for the whole year the following satisfactory results were seen:—The gross revenue for 1912 amounted to £747,000, against £689,000 for 1911, showing an increase of £58,000, whilst the gross expenditure for the past year was within a few hundred pounds of the expenditure for 1911. Since December last the depreciation of investments, unfortunately, had further increased by about £17,000, which would be dealt with during the current year. The cable which the Eastern Telegraph Co. had arranged to lay between Aden and Colombo to connect with their new cables would probably be completed towards the end of the current year, and their further sections between Penang and Hong Kong were expected to be laid and opened for traffic in the early part of 1914. The cost of their new cables would amount to about £750,000, which would be charged against the general reserve fund. The revenue balance carried forward for 1912 amounted to £27,000, against £23,000 carried forward in 1911. The chairman then referred to the proposed new articles of association, and remarked that in addition to the necessary changes to bring them up to date, it was proposed to restrict the directors' borrowing powers, which at present were unlimited, to two-thirds of the nominal amount of the capital. Provision was also made for the appointment and payment of committees of the directors—such payment not to exceed £1,000 per annum without the previous sanction of a general meeting. The new articles also provided for the holding of annual instead of half-yearly meetings.

Mr. F. A. Bevan seconded the motion.

The Chairman, in reply to a shareholder, who suggested that in view of the flourishing condition of the company the directors might increase the dividend, said he believed their policy of putting their money to reserve was one which on the whole commended itself to the shareholders. By that means they had been able to maintain a steady dividend and to undertake very large extensions of their cables, thus giving the company stability and ability to meet the demands which were constantly being made upon them for lower rates, and a consequent increased volume of traffic passing over their cables. The directors still considered that policy to be the right one, and that it would be a great mistake, especially at the present time, to pay a higher dividend. With regard to wireless telegraphy, there had been nothing in the development of that system during the past year which in any way affected the question. Of course everybody knew that it was the intention of the Government to set up the system in various parts of the globe, but as to whether in view of wireless telegraphy the company was wise in extending its cables, the view of the board was that it would never do for them to be caught napping by finding themselves in the position of not having sufficient cables to do their work. They could not hold their hands and wait for the extension of wireless telegraphy, which might or might not compete with them for the traffic. It would be suicidal to pause in any way and let the traffic which they had fall behind for want of proper cable facilities.

The reported was adopted, and subsequently the new articles of association referred to by the chairman were approved.

Prospectus.—*Nitrogen Products and Carbide Co., Ltd.*—The list was to close on 21st inst. in an issue of 1,231,000 shares of £1 each, offered at par. The company has been formed to acquire the undertakings particularised in our "New Companies" section to-day. The principal objects of the company are to manufacture carbide, cyanamide, nitric acid, nitrate of ammonia, sodium cyanide, and other nitrogenous products. The company intends at once to proceed to harness up about 100,000 E.H.P., and to install plant, embodying furnaces of a type entirely different from those hitherto used at Odda, and capable of producing about 200,000 tons of cyanamide per annum. Of this quantity it is intended that 100,000 tons shall be utilised for conversion into about 50,400 tons of nitrate of ammonia at works to be erected adjoining the cyanamide factory, and that of the remaining 100,000 tons of cyanamide, part shall be used in the manufacture of sodium cyanide and the balance shipped to various parts of the world, where plants will be installed for converting it into nitric acid.

Kalgoorlie Electric Power and Lighting Corporation, Ltd.—The directors report that for the year to December 31st the decrease in the profit is chiefly due to the damage done to the plant and transmission lines by the violent cyclone which occurred in February of last year. The direct cost of rebuilding the damaged works, including new material, amounted to £2,436; the actual loss of revenue and the extra cost of operating during the reconstruction of the condensing plant amounted to about a further £2,500. The amount of power sold was larger than in any previous year. In accordance with the usual custom, £7,500 has been placed to reserve for depreciation and renewals, bringing that account up to £38,000. The balance to be carried forward is £992. The directors much regret that the financial position does not permit them to recommend the payment of a dividend on the ordinary shares. A new unit of plant has been sent to Kalgoorlie and is now being erected, and will be in operation during the latter half of this year. It consists of a 1,080-B.H.P. Parsons turbine and a 750-KW. alternator. The synchronous motors, referred to last year, have also been sent out. When these new items of plant are working, higher efficiency will be attained, resulting in a lower cost per unit of power.

Traction and Power Securities, Ltd.—The directors report that the profit and loss account for the year 1912 shows a credit balance of £31,259, plus £9,996 brought forward, making £41,255 to be dealt with. The directors have transferred £30,000 to investment reserve account, leaving a balance of £11,255 to be carried forward. The investment reserve account now stands at £190,000 The *Financial News* says that the company's loan to the Clyde Valley Electrical Power Co. has, since the date of the balance-sheet, been repaid out of the proceeds of an issue of preference shares made by the Clyde Valley Co. In view of the liquidation of this loan, the directors have been approached by an influential body of shareholders with the request that a portion of the paid-up share capital be repaid. After full consideration, the board have resolved to recommend the repayment of £2 per share on the issued shares, the nominal value of such shares being at the same time reduced from £10 to £8 per share.

Coventry Electric Tramways Co.

The directors' report for 1912 stated that during the year the company received from the Coventry Corporation payment of the purchase price of the undertaking, in accordance with the arbitration award, so that the asset appearing in the last balance-sheet, under the head of construction and equipment account, does not appear upon the present balance-sheet. The amount received from the Corporation was £202,132, add sundry other receipts amounting to £87, stock reserve as per last balance-sheet £358, making total capital receipts of £202,578; deduct capital outlay as per last balance-sheet £201,186, leaving net surplus upon construction and equipment account of £1 392 Out of the funds received the company has paid off the liabilities appearing in the 1912 balance-sheet, including £34,000 on mortgage bonds, £21,470 new General Traction Co.'s account and sundry other creditors. The income received during the year under review amounts to £6,596. After deducting mortgage interest and other charges, there is left a profit of £5,440, to which is added £250 brought forward, making £5,689 available for distribution as dividend. The directors recommend that this amount be appropriated as follows:—£5.525 to the payment of a dividend at 8s. 6d. per share, and £164 carried forward. In January, 1913, the directors refunded to the shareholders by way of a return of capital £129,350, amounting to £9 19s. per share, in accordance with the resolution passed at the extraordinary general meeting held on November 8th, 1912. This still leaves a balance out of the purchase money which will in due course be distributed amongst the shareholders.

Potteries Electric Traction Co., Ltd.

The annual meeting was held on Monday, at the Electrical Federation Offices, Kingsway, W.C., Mr. G. F. M. Cornwallis-West presiding.

The Chairman, in moving the adoption of the report (see Electrical Review, page 818), congratulated the shareholders upon the result of the year's working, especially considering the serious effects of the coal strike at the commencement of the year, and the inclement weather of the whole of last summer. Dealing with the capital account, £2,558 had been spent, £1,551 being on account of the improvement and reconstruction of the permanent way. He did not want them to go away with the idea that all reconstruction work was paid for out of capital. Where they had to put down a heavier rail, which was a considerable item of expenditure, they had debited that amount—that was the difference between the original cost of the lighter rail and that of the new rail—to capital account. Under all other headings this expenditure had been debited to revenue or to renewals. The traffic showed a decrease which he considered small when they took into consideration the two adverse factors already alluded to. The total amount was only £505. As he informed them last year, the traffic receipts showed up to the commencement of the strike an increase of £790 over those for 1911. At the end of the strike that increase was turned into a decrease of over £2,500, so that, roughly speaking, they lost £3,500. These figures would give them some indication of the probable results of the year's working, but for the labour trouble. On the top of this absolute loss of £3,500, it must be remembered, in considering the revenue account, that an additional burden was thrown upon the staff in the maintenance of the service. Fuel had to be obtained at any price, and in addition to being costly, it was of a very inferior quailty; it was even necessary to go to the length of obtaining coal from out-crops in the district, and the energies and resources of the staff during this trying period deserved the highest praise. The parcels receipts continued to show increases, and the advertising receipts remained at about the same figure as the year before. Under the heading of sundry receipts, there was an apparent decrease of some £1,900, but this was entirely accounted for by the different manner in which they were dealing with the sale of scrap material. In past years all cash so received was credited to sundry receipts; this year the value of the scrap sold was credited to the work in hand from which the scrap was taken, as shown in the balance-sheet, where the sum of £2,085 was credited to renewals account. Interest and dividends on their holding in the North Staffordshire Tramways remained the same as last year. On the other side of the revenue account, despite the difficulties under which they were working, their power, running, and parcels expenses, had not increased in total; in fact, they showed a small decrease of about £100. and administration expenses also remained at about the same figure as last year. Repairs and maintenance, after excluding the sum to which he had already referred as realised for the sale of scrap, showed a reduction of £1,464. He wished most emphatically to state that they might not look forward to any reduction in the future in this item of expenditure. In the year 1905 he went very fully into the details of a financial arrangement they were making for the renewal of the permanent way. In that year £2,500 was allocated to be set aside for renewal purposes. Year by year the contributions to that fund had been increased, viz., £3.500 in 1907, £5,409 in 1908, £7,090 in 1909, £7,525 in 1910, £12,000 in 1911, and this year £12,500. That meant they had set aside a sum of £50,000 during the last seven years for renewals. They were able to forecast within certain narrow limits the probable expenditure in the years to come, and in dealing with this point, he thought he should tell the shareholders that they were at present negotiating with the Corporation of Stoke for an extension of their tenure. As they all knew, under the present Act and Light Railway Orders, the tenure of the tramways expired in 1917, and of the light railways in 1932. Negotiations were proceeding, and they would readily appreciate that they were of a somewhat delicate nature, so that until final terms, or otherwise, were arrived at, it was not advantageous to go more fully into the details. Directly the matter was settled one way or the other, all the shareholders would be apprised of the fact. He mentioned that now, because of its bearing on the amount they proposed to set aside to the renewals fund. If they were able to prolong the tenure, those amounts would be somewhat varied, but he would say this: that in all probability in the next eight or nine years, assuming they came to terms with the Corporation, there would for certainly three or four years be shown a balance carried forward on the debit side of the renewals fund, which would be more than made up a few years afterwards, when they would see a b'g amount on the credit side. Summarising the result of the year's working they might look upon it in this way: They were able to provide £500 more for renewals; place the same amount to reserve, pay the same dividend on the ordinary shares, and carry forward £136 less than was brought into the account. In other words, despite labour troubles and inclement weather, they were £365 better than in 1911, which was almost a record year for the company. With regard to the present year, the conditions were satisfactory, and there was a very substantial increase in the traffic receipts for this year, as compared with 1912, but they must bear in mind that the period they were dealing with compared with the period last year in which the strike occurred. Still, the receipts were close on £6,000 up, as compared with last year. That was very satisfactory.

Mr. S. Mear seconded the motion, and the report was adopted.

Swiss Electrical Companies.

The Akkumulatoren Fabrik Oerlikon, of Oerlikon, reports that the workshops were satisfactorily employed in 1912, and the turnover increased, particularly in heavy batteries. After placing £5,000 to the depreciation fund, as against £5,400 in 1911, the accounts show net profits of £12,700, as contrasted with £12,400 in the preceding year. The dividend is at the rate of 20 per cent. on a share capital of £48,000, the same as in 1911.

The Société Franco-Suisse pour l'Industrie Electrique, of Geneva, reports total receipts from interest, dividends on investments, &c., of £104,000 in 1912, as compared with £95,000 in the previous year. The payment of interest on the loans of £944,000 leaves net profits of £56,000, as against £47,000 in 1911. It is intended to distribute 5 per cent. on the share capital of £1,000,000, this rate contrasting with 4½ per cent. in the preceding year.

The Schweizerische Gesellschaft fur Elektrische Industrie (Swiss Electrical Industry Co.), which is an investment trust closely associated with the Siemens & Halske Co., has an ordinary share capital of £800,000 and 4½ per cent. bonds of £1,200,000 and 5 per cent. bonds of £600,000, the last of which were issued in 1912. According to the report for 1912 the gross profits amounted to £136,000, as compared with £102,000 in the preceding year, and, after deducting interest on bonds and defraying general expenses and taxes, the net profits are returned at £69,000, as against £50,000 in 1911. It is proposed to pay a dividend of 7 per cent., being the same rate as in the previous year.

The Motor A.G. fur Angewandte Elektrizitat, of Baden (Applied Electricity Co.), which is intimately connected with Brown, Boveri and Co., reports an extension of its sphere of activity in the working of, or investment in, electrical undertakings in 1912. The share capital was nominally increased by £400,000 to £1,200,000, the paid-up capital being £916,000, and a further loan of £200,000 at 4½ per cent. was issued, thus raising the loan capital to £1,000,000. As gross profits from the operation of works, installation business and investments, the accounts indicate the sum of £123,000, as compared with £95,000 in 1911. After meeting general expenses, interest on loans and depreciation, the net profits and balance forward total £68,000 as against £53,000 in the previous year. It is intended to pay a dividend of 7 per cent., as contrasted with 6½ per cent. in each of the two preceding years.

The report of the *Elektrizitats Gesellschaft Alioth, of Basle*, most of whose share capital is held by Brown, Boveri & Co., of Baden, states that the specialisation of production and the division of work among the different works were carried out in 1912, and the way thereby paved towards the ultimate transfer of the Münchenstein shops to Brown-Boveri. The construction of new types of motors was commenced in the spring, and the erection of locomotives was added late in the autumn. During the second half of the year the company was very well employed, and a number of uncompleted orders were brought over into the new year. The realisation of the credit with the former representatives in Italy had been fully effected, and that in the case of the Spanish company had been almost entirely carried out, whilst the liquidation of business in France was proceeding along a normal course. As a result, it had been possible to redeem the whole of the banking credit of £60,000. In addition, the 4½ per cent. loan of £80,000 had been paid off, the Brown-Boveri Co. having made an advance for this purpose. The profits for 1912 amount to £18,900 as compared with £19,500 in 1911, and after allocating £7.000 to depreciation as against £6,800, the balance permits of the payment of a dividend of 4½ per cent. on the share capital of £240,000, being the same rate as in 1911.

Tramways and General Works Co., Ltd.—The directors report for the year ended March 31st, a profit, including £151 brought forward, of £1,142. A dividend of 1s. per share is recommended carrying forward £142.

Mexborough and Rawmarsh Construction Syndicate, Ltd.

THE annual meeting was held at 3, Laurence Pountney Hill, E.C., on Monday, Mr. L. B. Schlesinger presiding.

In moving the adoption of the report (see ELEC. REV., page 819), and the declaration of a dividend at the rate of 2 per cent. per annum, the CHAIRMAN said that the expenses of working amounted to the small total of £13 15s., and the balance of £3,522 was £20 in excess of the dividend received from the Mexborough and Swinton Tramways Co. No charge had been made by the National Electric Construction Co. for the services of secretary, offices, and clerical staff. The directors had again waived their fees. The balance to the credit of profit and loss account was £3,695, compared with £4,547 for 1911, the difference being due to the reduced amount received from the Mexborough and Swinton Tramways Co. by way of dividend. Referring to the accounts of the Mexborough and Swinton Tramways Co., the chairman said that the traffic revenue showed a decrease of £506, which was wholly attributable to the coal strike. When he addressed them on April 15th last year, the traffic receipts at that date showed a decrease of about £400, as compared with the corresponding period of the previous year, and although he expressed the hope that they might make up this deficit by the end of the year, his hopes were not realised. The traffic receipts for the current year up to the 16th inst. showed an increase of £936 over the corresponding period of last year. There was a decrease of £428 in the profit derived from the tramways undertaking, which could be attributed solely to the decrease in revenue, as the working expenses were less than those for 1911. The results of the Rawmarsh electric lighting undertaking were unsatisfactory, as they showed a loss of £211, as compared with a profit of £138 in 1911. On the other hand, the Swinton undertaking showed a profit of £91, against £37 in 1911. Here again, however, the coal strike had hit them badly, as it had all supply undertakings throughout the country. In January of 1912 they were paying for coal 6s. 3d. per ton. In June this had risen to 8s. 6d. per ton, and in December to 9s. 6d. The total cost for fuel amounted to £1,901, as compared with £1,572 in 1911, an increase of £329, which was almost wholly due to the increased cost. During the year 1,069 8-C.P. lamps were connected to the mains, and at the present moment negotiations were in hand for several motors. They had also been requested by a colliery to quote terms for the supply of something like 800,000 or 900,000 units per annum, and this matter was having the attention of their engineers at the moment. If such a consumer could be obtained on reasonable terms, their accounts would show very differently indeed, as it would practically double their output. The plant extensions referred to in the report should be completed about the end of September, and they would effect substantial economies in working. If they got the Bill for which they were applying, it would enable them, at a comparatively small capital expenditure, to connect with the tramways the populous districts of Wath, Denaby and Conisborough. The additional population to be served would be about 30,000. These districts, although within a mile or so of their tramway system, had no connection with it; in fact, they had practically no travelling facilities at all, and it was originally anticipated, he thought with reason, that the tramways would be taken advantage of by the inhabitants of these districts, but this had not been the case, or at least, only to a very small extent, but with such a system in operation it should, in addition to earning a good profit, have a very beneficial effect on the revenue of the tramway undertaking, to which it would act as a feeder. The directors had no hesitation in saying that if the powers were granted, there should be an immediate increase in value of the shareholders' property. While they had had a set-back this year, owing to the coal strike, they had no reason to be discouraged.

The report was adopted.

Deutsch-Atlantische Telegraphen Gesellschaft.

THE report of the German Atlantic Telegraph Co. states that the Atlantic cable traffic experienced a further development in 1912, and that on the Vigo cable increased in one direction, and slightly declined in the other. During the year one of the company's Atlantic cables, as well as the Vigo cable, was interrupted for short periods. Nevertheless, it was possible to deal with the traffic on the other cable sections without much delay. The repairs were carried out promptly and comparatively quickly by the cable steamer *Grossherzog von Oldenburg*, notwithstanding the very unfavourable weather which prevailed. The Norddeutsche Seekabelwerke, in which the company holds an interest of £150,000, has been engaged on the manufacture of the Monrovia-Togo-Cameroons cable for the German South American Telegraph Co., as well as on various telephone and telegraph cables for abroad, and the Seekabelwerke's dividend of 10 per cent. for 1912 will be brought into the accounts for 1913. The introduction of the Heurtley system, whereby a considerable increase in the speed of transmission on cables is rendered possible, was almost completed. In the case of the Vigo cable the result had been that the traffic, which would have necessitated a doubling of the cable in the near future, could now still be handled with the single cable. The general introduction of radiotelegraphy on ships had yielded a satisfactory volume of traffic to the cables through the coastal stations, and, instead of being a competitor, it had grown into a valuable feeder to the cables. Concerning the "L.C." private telegrams at half rates, which were brought into operation on January 1st, 1912, the report records a good development and a permanent increase, and it is also mentioned that the rates for Press messages were reduced from 50 pfennigs to 35 pfennigs (6d. to 4½d.) on December 1st, 1912. A further extension of the system of the telegraphic transmission of money had taken place by the inclusion of the neighbouring countries of Luxemburg and Switzerland. It is also stated that the obligation to lay cables for the Portuguese Government in the Azores had been discharged by the establishment of wireless connections at a single cost of £10,000. The accounts show gross receipts of £288,000 for 1912, as compared with £267,000 in the previous year. After meeting general expenses and taxes, the cost of cable repairs, and placing £30,000 to the cable redemption fund, as against £29,700 in 1911, the net profits are returned at £139,700, as contrasted with £141,000 in the preceding year. It is proposed to pay a dividend of 7½ per cent. on the share capital of £1,200,000, being the same rate as in each of the two previous years.

German Electrical Companies.

THE *Elektrotech. Fabrik Rheydt Max Schorch & Co.* records an increase of 60 per cent. in the turnover in 1912, although selling prices did not keep pace with the higher cost of raw materials. As net profits the accounts indicate the sum of £9,900, as against £9,800 in 1911, and the dividend at 8 per cent. is the same as in the previous year.

The *Elektrochemische Werke, of Berlin-Bitterfeld*, earned gross profits of £82,000 in 1912, as against £89,000 in the preceding year, the net profits being £60,000 as compared with £67,000 in 1911. It is intended to distribute 10 per cent., being at the same rate as in 1911. Most of the departments at Rheinfelden and Bitterfeld are leased to the Griesheim-Elektron Chemical Co., the company restricting its operations to the production of oxalic acid.

The financial statement of the *Sachsenwerk Licht und Kraft A.G., of Niedersedlitz*, records gross profits of £39,000 for 1912, as contrasted with £27,800 in 1911. Depreciation absorbs £8,700, as compared with £6,500, and the net profits were £30,300, as against £21,300 in the previous year. It is proposed to pay a dividend of 6 per cent., as in 1911. The orders on hand on January 1st, 1913, were 30 per cent. in excess of the preceding year, and the increase in orders this year indicates favourable prospects.

The accounts of the *Norddeutsche Seekabelwerke, of Nordenham*, whose share capital is held in equal halves by the German Atlantic Telegraph Co. and the Felten & Guilleaume Co., show that the sum of £26,000 has been placed to depreciation in 1912, as compared with £33,000 in the preceding year. The amount placed to the reserve fund is £2,300, as against £16,000 in 1911, whilst the benevolent fund receives £1,500, as contrasted with £6,500. As net profits, the accounts indicate £51,000, as compared with £72,000 in 1911, and a dividend of 10 per cent. is proposed on the share capital of £300,000, being the same rate as in the previous year.

The report of the *Kabelwerk Duisburg, of Duisburg*, states that all departments were well employed in 1912. The selling prices for insulated wires and insulating tubes slightly advanced, and satisfactory prices were realised for lead cables, in which business was active, especially for State and communal authorities. The gross profits were £73,000, as against £60,000 in 1911, and the provision made for depreciation is £24,000, as compared with £16,000. Out of the net profits of £23,800, as contrasted with £23,000 in 1911, it is intended to pay 14 per cent. on the share capital of £112,500, being the same as in 1911. The share capital is now to be raised to £150,000 in order to provide for the extension of the works.

The *Deutsche Kabelwerke, of Berlin-Rummelsburg*, state that the volume of business transacted in 1912, was considerably greater than in the previous year. Including the balance brought forward, the gross profits reached £75,000, as compared with £60,000 in 1911. After deducting general expenses, taxes and interest charges, and apportioning £12,000 to depreciation, as against £5,800, the accounts show net profits of £31,000, as contrasted with £24,000 in 1911. The dividend in contemplation is at the rate of 8 per cent., this comparing with 7 per cent. in the preceding year. An abundance of orders had been brought over into the new financial year, and the turnover had so far shown an increase. It is mentioned that the subsidiary companies experienced a further favourable development in 1912. The Union Cable Co., of Dagenham, whose new factory was set in operation last autumn, is well employed at the present time.

The directors of *Voigt & Haeffner, of Frankfort-on-Main*, report that a considerable increase in the turnover took place in 1912, the business extending to almost all countries. On the other hand, the cost of raw materials was greater, and larger expenses had to be incurred for wages. The disquiet produced by political events, and the dearness of money, did not have any disadvantageous effect upon the undertaking during the year, although it must be assumed that a continuance of these conditions will cause reserve in the allocation of orders. The orders brought over into the new year exceeded in value those of the previous year, but indications in the direction mentioned are already on hand. The gross profits amounted to £141,000, as compared with £100,000 in 1911, and after meeting general expenses and ordinary depreciation the accounts exhibit net profits of £72,000, as against £42,000. It is intended to distribute 10 per cent. for 1912, being the same rate as in each of the five preceding years, and the sum of £25,000 has been placed to extra depreciation, as contrasted with £5,500 in 1911.

The report of the *Aluminium Industrie Gesellschaft, of Neuhausen*, for 1912, states that the exceptionally low price of the metal had opened up many uses for aluminium, which had favourably influenced the development of the industry, and enabled the company to dispose of the whole of the production. In the meantime

a new agreement has been concluded between the aluminium works for the purpose of securing stability in prices and a constant extension of the markets. The company's subsidiary departments—those for the output of carbide and nitric acid—had yielded results in accordance with expectations. After placing the sum of £56,000 to depreciation in 1912, as compared with £45,000 in 1911, the accounts showed net profits of £148,000, as against £92,000, these being increased to £183,000 and £131,000 in the two years respectively by the inclusion of the balance brought forward. A dividend at the rate of 20 per cent. has been declared on the paid-up capital of £520,000 out of a total nominal capital of £1,040,000, this contrasting with 14 per cent. in each of the two preceding years. Out of the balance of net profits the amount of £24,000 has been allocated as a first instalment to a fund intended for the gradual payment of the unpaid ordinary shares of £520,000. The company has realised its investment of £50,000 in the electric steel works of R. Lindenberg, and devoted the proceeds mainly to depreciation in connection with the Marseilles and Goldschmieden-Trotha subsidiary companies. At the recent meeting it was stated that the prospects for the current year were favourable, judging from the course of business during the first four months.

Allmana Svenska Elektriska A. B.

THE annual report for 1912 of the Swedish General Electrical Co. has recently been published. The company has a capital of £333,333, which is equally divided between ordinary shares and preference shares. The dividends to be paid are 10 per cent. on the preference shares and 8 per cent. of the ordinary shares, as compared with 9 per cent. and 7½ per cent. in 1911. The net profits amounted to £35,877 in 1912, £28,555 in 1911, £24,833 in 1910, and to £16,333 in 1909. The gross profits for 1912 amounted to £50,666, as compared with £42,166 for 1911, £31,000 for 1910, and £22,666 for 1909.

The course of business is shown in the following table :—

	1908.	1909.	1910.	1911.	1912.
Turnover	£670,000	£506,000	£733,333	£711,100	£777,400
Value of exports	58,333	68,777	117,444	174,777	212,333
Orders in hand, per December 31st, 1912 ..	—	—	186,500	205,000	276,500
Engines and machines delivered	3,760	3,845	5,506	6,011	8,001
1,000 KW.	140	105	230	220	272
Number of workmen ..	2,167	2,354	2,462	2,527	2,780

The above table shows in all figures a distinct improvement and increase, as compared with the previous years. The only exception is to be found in 1909, which year, however, was quite exceptional on account of the large and prolonged strike. The increase of the export figures is especially remarkable, and the progress is even more striking if a comparison be made with the value for 1906, when it only amounted to £27,000. The exports have in the course of seven years thus increased at a ratio of nearly 1 : 8. The flourishing state of the export branch may, to a great extent be explained by the enormous requirements for electrical machinery of the Norwegian nitrate industry, which was the company's best customer. As regards the prices obtained, these are stated to have been rather low, but this has been more than outweighed by the increased volume of business. In regard to future prospects, it is stated that there is no indication of any slackening of the demand for electrical goods and machinery, at all events as far as 1913 is concerned. With the view of securing more business in future, it is the intention of the directors to enter into a closer connection with a financial institution, so as to enable the company to take an active part in the promotion and financing of enterprises.

Belgian Electrical Companies.

THE *Société Générale Belge d'Entreprises Electriques, of Brussels*, which is an investment company, earned gross profits of £84,000 in 1912 as contrasted with £76,000 in the previous year. After making provision for general expenses, interest on loans, and making other appropriations, the accounts exhibit net profits of £62,000 as against £53,000 in 1911, the directors recommend a dividend of 10 per cent., this comparing with 9½ per cent. in 1911.

The report of the *Société Anonyme A.E.G.—Union Electrique* states that the general industrial development which was manifested at the beginning of 1912, enabled the company to again considerably extend its business. Whilst the augmentation which took place in 1911 was chiefly in connection with central stations and tramways, the increase in 1912 arose principally from the expansion in industrial transactions and in general sales. This result was due the decentralisation of the organisation which had been undertaken in recent years by the establishment of five offices at Antwerp, Ghent, Liége, Charleroi and Brussels. The extension of the business had necessitated an increase of 10 per cent. in the number of the *personnel* employed, which amounted to 722 workers, staff and engineers. The length of the working day had been reduced by 10 per cent., and the annual average wages of the workers and assistants advanced from £52 16s. in 1911, to £62 16s. last year. After making provision for depreciation of raw materials and manufacturers' and works' plant, the accounts show net profits of £15,800, or approximately the same as in 1911. It is proposed to pay a dividend of 6·8 per cent. for 1912, being the same rate as in the preceding year, on an ordinary share capital of £140,000.

The directors of the *Ateliers de Constructions Electriques de Charleroi* report a considerable increase in the orders booked in 1912, all the departments being abundantly provided with work. The value of the orders amounted to £771,000 as compared with £576,000 in 1911, and the company's customers were retained notwithstanding the efforts put forward by foreign competitors. Including the balance brought forward the accounts indicate profits amounting to £78,000, of which £39,900 has been devoted to depreciation, thus leaving a balance of £38,100. It is intended to pay a dividend of 14s. 10d. per share on the paid up capital. The share capital was increased to £800,000 in December 1912, and the premium of £80,000 realised on the issue has been applied to writing down the value of the works, so that the Charleroi-Mareinelle construction works, the Charleroi-la-Villete works, the iron and bronze foundry and the cable factory, wire drawing mills, and tube factory now stand at the value of one franc only in each case. The company gives employment to 2,500 persons. During the past year orders for electric motors for rolling mills have been executed for a number of the leading metallurgical concerns in Belgium, including the Cockerill Providence, Sambre-et-Moselle, Metallurgique du Hainaut Athus Grivegnee, Esperance-Longdoz Clabecq, and Thy-le-Chateom Companies. An extensive business was done in electric winding engines and other electric plant for collieries, installations of this kind having been put down at the Marcinelle Nord, Bonne Fin, Shepy Bracquegries, Andre-Dumont, &c. Electrically-operated mining pumps have also been supplied to the Grand Horun, Grand Conty, Reunis, and Ongree-Marihaye collieries. Considerable activity has also prevailed in the production of steam turbines and alternators, plants of this kind having been completed for the Société de Gaz et de l'Electricité de Hainaut, the Brussels Municipality, La Société de l'Electricité de l'Ouest de Belgique, La Société de l'Electricité du Brabant, La Compagnie Auxiliaire d'Electricité, La Société des Tramways de Tientsin (China), &c. In the electric cable department of the company the value of the orders secured was equal to three times that of those of the previous year, several important contracts for cables for from 15,000 to 18,000 volts having been completed, while the manufacture of 30,000-volt cables has been commenced. Among the orders recently completed or on hand, are cables for the Société des Tramways Bruxellois, the Ghent Tramways, the Ostend-Blankenberghe Electric Railway Co., La Société Auxiliare de l'Electricité, La Société Bruxelloise de l'Electricité, &c.

New General Traction Co., Ltd.

THE directors' report and accounts for the eight months ended March 31st, 1913, states that since July 31st, 1912, the date of the last balance-sheet, the liabilities of the company had been reduced out of the proceeds of the sale of the Coventry undertaking by the repayment of loans amounting to £40,700, by the redemption of the balance of £68,000 prior lien debentures, and by the repayment of £41,700 of 5 per cent. mortgage debentures, leaving £158,300 5 per cent. debentures still outstanding. The revenue received and accrued from the various sub-companies amounted to £19,013 for the period under review. The general expenses, including directors' fees and legal charges, amounted to £1,799. The accounts for the period show a profit of £10,288, to which is added £4,690 brought forward, making a total of £14,978 available for distribution. The directors recommend that this sum should be appropriated as follows : £10,480 to the payment of a 4 per cent. dividend, less income-tax, and that £4,498 be carried forward. The dividend received from the Coventry Electric Tramways Co. for the year ended December 31st, 1912, was 8s. 6d. per share. The accounts of the Norwich system show that there was an increase in the traffics for the year, and a decrease in the expenses. A dividend of 3 per cent. was received from that company for the year ended June 30th, 1912, as against 2 per cent. for the previous year. The Douglas Southern Electric Tramways, Ltd., paid 6 per cent. on its preference shares. The income received from the Philadelphia undertaking was in respect of the six months ended December 31st, 1912, and amounted to £6,965. The directors' reports and accounts of the Coventry Electric Tramways Co., the Norwich Electric Tramways Co., and the Douglas Southern Tramways, Ltd., are annexed to the report, and we publish them on other pages to-day.

Anglo-American Telegraph Co., Ltd.—An extraordinary general meeting of the shareholders of the above company was held on Monday at Winchester House, E.C., Mr. F. A. Bevan presiding, when the resolution which was passed at the extrordinary general meeting held on April 29th, providing new articles of association, was confirmed as a special resolution.

Submarine Cables Trust, Ltd.—At this company's meeting on Wednesday the chairman, Sir J. Denison-Pender, reported that the receipts for the year 1912 were £25,496 and the expenses £1,714. After adding the sum brought forward, the available balance was £23,850.

Melbourne Electric Supply Co., Ltd.—The directors have declared a dividend of 4 per cent. actual, free of income-tax, on the £300,000 consolidated ordinary stock, in respect of the half-year to February 28th. The *Financier* says that should the earnings of the company continue to show the same satisfactory expansion as they have done hitherto, the directors anticipate that the dividend on the consolidated ordinary stock for the complete financial year ending August 31st will be 10 per cent.

Calcutta Electric Supply Corporation, Ltd.

MR. PAGET V. LUKE, C.I.E. (chairman), presided on May 15th, at the offices, Salisbury House, E.C., over the annual meeting.

The CHAIRMAN, in moving the adoption of the report (see ELECTRICAL REVIEW, page 818), said the capital expenditure during the year was £127,509, largely on account of machinery and mains in connection with their new high-tension generating station at Cossipore. The total capital outlay up to December 31st amounted to £1,161,186. It was satisfactory to note that in letting the contracts for the work in connection with the high-tension station, there was a very considerable saving which went towards the cost of several additions to the original scheme, the demand for which arose as the work progressed. The revenue account showed on the debit side a normal increase in running costs due to a larger output. On the credit side there was a satisfactory increase in the sale of current, both for lighting and power purposes. Last year he expressed the hope that the supply of high-tension current from their new station would begin in July or August. As a matter of fact, the new machinery was in position in July, but owing to difficulties which not infrequently arose when starting new plant, it was found necessary as a precautionary measure, to keep some of the old stations running longer than was anticipated. But for this, there would have been a considerable saving in working expenses. The amount to the credit of depreciation and renewals was £79,310, and with the increase of £35,000, which it was proposed to add, it would amount to £114,310, which was a handsome figure, but none too large when they bore in mind the big additions to capital expenditure. It was also proposed to add to the reserve fund the sum of £5,000, and in future to credit to this fund the dividends on investments which amounted during last year to £1,987. Owing to the depreciation of some of the gilt-edged securities, the directors had decided to write £1,500 off their value to the debit of the revenue account. The most important feature of the year was the opening of the high-tension station at Cossipore. The initial difficulties connected therewith had been successfully got over, and they were now in a position to meet any demands for current likely to arise in the immediate future. The increasing demand for current in the Howrah district had culminated in a 20-years' contract for lighting the streets. Two heavy cables were successfully laid across the Hooghly River, and their old generating station at Howrah had been turned into a sub-station served from Cossipore. This laying of cables across a strong tidal river was a work of no small magnitude, and their staff had to be congratulated on its successful achievement. The estimated outlay in connection with the Howrah extension amounted to £18,400. A demand for current had arisen in the neighbourhood of Chetla, a district to the South of Calcutta, where rice-pulling mills were being erected. It had been decided to extend their mains to Chetla and to open a sub-station there. Although these outlays represented a very large expenditure, it was gratifying to see that the profits of the company continued satisfactory, and that there was no difficulty in maintaining the rate of dividend recently paid. The Calcutta improvement scheme had now entered on its second year, and they might soon see some of the proposed schemes put into force, the carrying out of which should tend to promote a demand for electric energy. There was every indication that the question of the economical use of electricity in place of steam had reached an acute stage, and the directors hoped, with the new high-tension plant now at their disposal, that the Corporation would be able to supply current at a price which would induce mill managers and other large consumers to come to them for the power they might require. The difficult matter of the rates to be charged for current was one which had the fullest attention from the directors and the consulting engineers. The supply of current at the cheapest possible rate must, however, be made consistent with a profit satisfactory to the shareholders and the building up of a sufficient reserve for contingencies. In December last one of the directors (Major-General Mahon) went to Calcutta to inspect the undertaking and report to the board. He went very thoroughly into the methods of working and accounts, and his visit and report had been of the greatest assistance, not only to the board, but to the agent in Calcutta, where arrangements had been made which, it was believed, would ensure economical and efficient management of the company's affairs, and prepare the way for carrying out the further extensions which must, in due course, become necessary. As regarded the transfer of the Capital to Delhi, the manager reported that, as expected, it had not affected the prosperity of the company to any extent. It was with much regret that he had to inform them of the retirement of their agent and manager, Mr. F. Rawson, C.M.G., who had so ably controlled their affairs in Calcutta for the past 5½ years. He had piloted the company's business through a difficult time with much tact and ability, and with great success, as the report in their hands testified. He was only leaving because he had no wish to remain another hot season in a tropical climate, and he would ask the shareholders to accord him a cordial vote of thanks for his services. Mr. R. E. Winkfield, M.I.E.E., who had been the chief engineer of the company, and had performed his duties to the satisfaction of the board, and who on several occasions had acted as agent and manager in the absence of Mr. Rawson, had been appointed agent and chief engineer. The board felt satisfied that in making this appointment they were consulting the best interests of the shareholders. The whole of the staff arrangements of the company had been reorganised, in consequence chiefly of the opening of the Cossipore station, and Mr. Winkfield would be assisted on the engineering side by a deputy, and also on the commercial side by the deputy agent. In making these new arrangements, General Mahon's report had been of much assistance to the board. The chairman next alluded to the question of directors' extra remuneration. They were of opinion that the time had come when a maximum should be fixed to the extra remuneration, and accordingly, instead of proposing an alteration in the articles of association, they had passed a resolution to limit, for the present, the maximum sum to be divided amongst the directors in any one year to £2,500. The agent and the staff had passed through an arduous year of work consequent upon the entire change of the methods of generating and distributing electrical energy, and the satisfactory result of the year's working was in no small measure due to the excellent manner in which they had carried out their duties. The agent bore testimony to this good work of the staff in his annual report, and their services were well deserving of their appreciation. He was sure it would be the wish of the shareholders that the whole staff of the corporation should share in its prosperity. To this end the directors had in view a scheme for according a yearly bonus to the staff based upon the net annual profits.

COL. F. J. G. MURRAY seconded the motion.

MAJOR-GENERAL R. H. MAHON spoke at some length on the condition of affairs in India, and the result of his visit as the representative of the board, and said that having carried out a good many similar inspections, he had seldom found more to praise and less to take exception to. Their thanks were due to Sir Alex. Kennedy and Mr. Jenkin for the admirable lay-out of the central generating station, and the dependent sub-stations, which were arranged so as to be capable of extension, to a practically unlimited extent at the minimum of cost. Their engineers in Calcutta were also deserving of thanks for the successful conclusion of their strenuous task of changing from the old system of supply to the new, without a moment's inconvenience to the public. As to the plant itself, they had had a few minor difficulties, but these had been surmounted, and the latest returns reported an economy of production which was the principal justification of the directors in sanctioning the large outlay. He had also inspected the whole office system which was inaugurated by Mr. Reeves, their secretary, when he visited India some years ago, and which had proved sound and durable. Gen. Mahon referred to the question of the rates to be charged for electricity, and said that as the result of prolonged consideration the board had announced special low rates for very large manufacturers. He was informed that there was in Calcutta approximately 60,000 H.P. in use and available for their enterprise, and so far they had only absorbed a comparatively small fraction.

COL FILGATE suggested that the board might when possible give a small bonus to the ordinary shareholders, which might afterwards crystalise into an increased dividend. He also referred in eulogistic terms to the services of Mr. Rawson, and pointed out that during that gentleman's term of office of five years the net profits had practically doubled whilst the capital had only increased by a third.

The CHAIRMAN expressed the hope that the time would come when the company could pay a bonus.

The report was adopted.

On the motion of COL. FILGATE, a resolution was passed regretting the retirement of Mr. Rawson, and expressing the appreciation of the shareholders of his services to the company.

The CHAIRMAN pointed out that whilst theirs was a commercial undertaking, yet they were engaged in a work which was of real benefit to the people. He was constantly told that the conditions of life in Calcutta had altogether changed since the introduction of electricity.

Norwich Electric Tramways Co.

THE directors' report for the year ended June 30th, 1912, shows that the total receipts were £36,713, an increase of £1,069, and the total expenditure was £26,730, a decrease of £429. The net profit was £9,983, an increase of £1,498. The above amounts for expenditure include debenture interest, donations and London expenses. Adding £1,013 brought forward from last year (after paying the dividend and providing for the reserve), there is a total of £10,996 to be dealt with. The directors recommend that of this, £2,500 should be put to the reserve fund account, £7,920 to the payment of 3 per cent. dividend for the year ended June 30th, 1912, and £576 carried forward.

	1911.	1912.
Car-miles run	1,089,385	1,050,453
Passengers carried	8,490,019	8,817,953
Earnings per car-mile	8·23	8·39
Expenses per car-mile	5·65	5·50
Earnings per passenger	0·99	0·97

Altrincham Electric Supply, Ltd.

THE directors' report for the year ending December 31st, 1912, says that during the year 76 new installations have been connected to the mains, making an addition representing 10,449 30-watt lamps. After allowing for various disconnections and re-connections, there were, at December, 1912, 1,382 actual consumers and an equivalent of 87,631 30-watt lamps connected to the mains. Twenty-nine installations, comprising 655 30-watt lamps, were in progress. There has been an increase of nearly 88,000 units sold, and notwithstanding considerable additional expenses incurred during the coal strike, and certain repairs to the boilers, the total cost of generation has been only slightly in excess of that for the previous year. Further capital expenditure amounting to £5,777 has been made during the year. Of this amount £3,279 was for plant, and £1,526 for mains. The re-construction on

modern lines of the high-tension and low-tension switchboards at the generating station has been satisfactorily completed, and suitable extensions added to control the new plant. The company was granted a provisional order extending the authorised area of supply, which order received the Royal Assent on August 7th, 1912. The accounts show a profit for the period covered of £5,712, making with the balance of £78 brought forward £5,790, and this has been dealt with as follows:—Written off old stock, £800; general reserve for depreciation, £1,000; general reserve account, £3,500; leaving to be carried forward, £490. In view of the sum expended on capital account during the year, and the considerable sums shown to be due for loans and to the company's bankers, the directors much regret that they are unable to recommend the payment of a dividend. Mr. Henry Wolfenden and Mr. William Murray have retired from the directorate, and Mr. Charles Jermyn Ford has been elected a director and chairman of the company to fill the vacancy created by the retirement of the former.

The meeting was held on May 8th, at the offices in Queen Street, E.C.

Units generated—Gross	1,129,319
Pumps, &c., motors	66,893
Net	1,062,426
Units sold—By contract	190,765
By meter, private consumers	376,263
Total sold	567,028
Used on works	32,960
Total accounted for	599,988
Not accounted for	462,438
Total max. supply demanded, KW.	587

Shanghai Electric Construction Co., Ltd.

THE annual meeting of this company was held on Thursday last week at Basildon House, Moorgate Street, E.C., Sir Alfred Dent, K.C.M.G., presiding.

The CHAIRMAN, in proposing the adoption of the report (see ELEC. REV., page 819), said he referred last year to the considerable amount of vitality that was latent in their undertaking, and that statement he trusted they would consider was borne out by the accounts. The gross traffic receipts, after deducting £23,937 for loss in exchange, of £79,783, against £58,333 in 1911, and after the further deduction for operating expenses in Shanghai, showed a net profit of £27,727, as compared with £14,139 for the previous year. Including the amount brought forward, £3,301, the balance of profit and loss account amounted to £28,029, and that balance they proposed to deal with by transferring to reserve for renewals account £8,500, for reduction of preliminary expenses £1,554, to the payment of a dividend of 5 per cent. for the year £16,000 (less income-tax), leaving to be carried forward £1,974. The reserve for renewals, after charging the account with cost of renewing some of the trolley wire, would then amount to £17,883. The power expenses at £13,137 showed an increase of £1,887 owing to the increased mileage. The five-year agreement having now expired, negotiations for a revision of rates were in progress, and they hoped to get the full benefit of the reductions given to the general body of consumers. The expense ratio for the year was reduced to 66½ per cent., as compared with 71¾. The statistics given at the end of the report showed the car-mileage as 2,747,088, or an increase of 505,975. The total number of passengers carried was 40,734,233, as against 27,257,250, or an increase of 13,475,983, and passengers per car-mile 14·83, as against 12·16 in 1911. The loss in exchange brought about by the excessive issue of copper currency by the native authorities amounted this year to £23,937, against £15,477, showing an increase of £8,459. This represented a loss of nearly 7½ per cent. on the capital, and was the most serious of the disadvantages which affected their profit and dividend. It was a feature that did not exist when the company was formed. The matter had been taken up by the China Association in the interest of the tramways and the trading community, and members of the Association would have noticed the correspondence with the Foreign Office on the subject. They seemed still to be a long way off a solution of the many difficult problems connected with currency reform, but there was some satisfaction in knowing that the Ministry of Finance had made a thorough investigation, and that as soon as a definite scheme had been drawn up, the defects of the present situation would gradually be removed. After providing for a substantial expenditure on capital account, the loan from the bankers on December 31st was reduced to £15,000—as compared with £31,000—at the end of 1911. It had been further reduced since the account was made up, and now amounted to £12,000, but to meet their requirements, including the balance of cost of new motors and trailers, it would be again increased, in anticipation of the new issue of capital to which he referred last year—a matter which, in view of the increase in their receipts and the late repayments of the loan, they had left in abeyance until their financial position could be more readily defined than was possible at present. Taking the accounts as a whole, they showed a marked improvement over any that they had hitherto been able to present, and a particularly gratifying feature was that the profits permitted them to recommend a dividend for the year at the rate of 5 per cent. The fact of their having carried 40¾ millions of passengers last year, showing an increase of about 50 per cent. on the preceding year, and the continued expansion of traffic and operating profits this year, indicated that the sections and scale of fares had now been adjusted to a point at which they fulfilled local requirements. It also proved the necessity for the additional motor-cars and trailers referred to last year. Reference was made in the report to the proposed introduction of railless traction. This was a matter to which the general manager, Mr. McColl, directed his attention when he was home on leave during the latter part of last year. He inspected railless systems in England and on the Continent, and went very carefully into the question of operating expenses and the adaptation of existing types of railless vehicles to the special conditions of Shanghai, and reported in favour of the scheme. The development of the company's business in such a way as to secure a larger proportion of the total movement of Shanghai, had received their serious consideration, and of all the schemes which had been presented, railless traction offered by far the best prospects, and was more nearly akin to their tramway business than any of the others. The advantage of the railless car was that it could be operated in narrow thoroughfares which were unsuitable for the fixed rails of a tramway, and being dirigible it could, by means of a pivoted trolley arm, deviate widely from the line of the overhead trolley wires, and thus pass other traffic or an obstruction which would block a car running on a fixed rail. The cost of a car would be rather more than that of a tramcar, and the upkeep somewhat heavier on account of tire repairs, but the daily operating expenses of a tramcar and a railless car of equal carrying capacity should be approximately the same. The great advantage of the railless system was that the heavy cost of laying down a permanent track was entirely saved, and that the relatively inexpensive equipment could be easily transferred if desired from one street to another at a small expense. It should, therefore, be the nearest approach to the motor-bus which was so steadily absorbing the traffic in many London streets, with the many obvious advantages of electricity over petrol as the driving power. The directors, having grounds for believing that railless traction might offer good prospects of increasing the company's earnings, and recognising the necessity for the company owing to their present concession, being first in the field should any new form of electric traction be sanctioned, authorised an application to be made to the Council in February for leave to introduce an experimental installation, which was estimated to cost about $80,000 with a full equipment of cars. That application was granted, on condition that they paid the Council 5 per cent. of the gross earnings and a reasonable contribution towards road maintenance. It was intended originally that the trackless line should run through Horian Road, but Fohkien Road had lately been substituted, concerning which they waited further advice. If the experimental installation proved to be a success, an extension of the system would be brought about as funds permitted, and new districts opened up where tramlines were at present impracticable. Through running with the French Settlement was inaugurated about the middle of June on one route and on a second route in the middle of August. The results of the arrangement entered into with the French company had, in a measure, been satisfactory, and had demonstrated that a demand for through facilities existed. They did not consider that the demand would be adequately met until a larger service of cars was available, and through tickets, to which the French company had hitherto objected, had been arranged for. It was anticipated that the improvement in the company's position would continue as the year advanced and the additional motor-cars and trailers came into use, and they were confident that the final result of 1913 would show a good improvement on 1912. They had a record for the race week ended 7th inst., having carried 940,000 passengers, with effective receipts $18,600—against 810,000 passengers and receipts $16,000 in the corresponding race week of 1912. The wonder was how this was done with their existing rolling stock, but it showed that the staff in Shanghai, both foreign and native, were working as loyally and assiduously as ever in the interests of the company, and their thanks were due to them and to the local board for their efficient management of their affairs.

MR. J. S. HASKELL seconded the motion, which was adopted.

Vera Cruz Electric Light, Power and Traction Co., Ltd.

THE sixth ordinary general meeting was held on May 14th, at Salisbury House, E.C., Mr. V. W. Yorke presiding.

The CHAIRMAN, in proposing the adoption of the report (see ELECTRICAL REVIEW, page 777), expressed regret that the meeting had not been called at an earlier date. Two years ago he said he hoped they would always be able to hold the meeting before the end of March, and last year they were able to do this, but, unfortunately, owing to the disturbed conditions in Mexico during February and March, there had been difficulty in getting the accounts completed, and consequently they were later than usual. He was glad to be able to present that day a thoroughly satisfactory report and accounts, both sections of the company's business having shown a steady and regular increase during the year with corresponding increases in the net revenue. They had not received as much revenue at they had hoped under the contract with the Terminal Co., owing to a considerable falling off in import traffic, but with a revival of trade these receipts ought to show an increase. The contract with the Puebla Tramway, Light and Power Co., which had been arranged since the last general meeting, placed at their disposal a large supply of power, and would enable them to increase their business without incurring further capital expenditure. The Puebla Co. hoped that the supply of power would be available before the end of the year. As soon as they got it, the temporary steam plant in use would be dismantled, and they had made arrangements by which they hoped to dispose of this plant, which had served a useful purpose, at very small loss to the company.

They had transferred from the profits of the year £5,000 to depreciation and general reserve before arriving at the amount recommended as dividend. This amount added to that of last year brought the reserve up to £20,000, which was satisfactory considering that they had only reached the early stages of their history, and, as pointed out last year, the depreciation on an undertaking like this, where the property was fully maintained and kept in first-class condition, was not large. Therefore the provision they were making this year was, in their opinion, ample. As regarded the results of the current year, the earnings they had published showed an increase of $13,000 for the first three months of the year, which was certainly satisfactory. He was glad to say that political conditions in Mexico showed distinct improvement to those prevailing in the earlier part of the year. They had their share of the troubles during the year, and Vera Cruz was occupied by General Felix Dias in February, and some fighting actually took place in the city. He was glad to say, however, that their business and property suffered only to a trifling extent from these disturbances, and as soon as the political conditions became settled again a real revival of business might be anticipated in which they would participate. He had to express on behalf of the board their appreciation of the zeal and energy shown by the general manager and the staff working under him in Mexico.

Dr. S. Mackew seconded the motion.

Mr. Watkin asked how the loan of £7,250 standing in last year's balance-sheet had been paid off; and also when they could expect a quotation of the shares?

The Chairman said the loan was paid off out of revenue. It was expected they would soon get a Stock Exchange quotation.

The report was adopted.

Douglas Southern Electric Tramways, Ltd.

The directors' report for the year ending October 31st, 1912, says that the company's season consisted of 124 days, against 118 days last season; and the mileage run was 34,647·5, against 34,578·3 last season. The total traffic receipts for the season were £5,204, against £5,645, a decrease of £441, due to the cold and wet weather. The passengers carried were 212,528, a decrease of 18,125. The tolls payable to the Douglas Head Marine Drive, Ltd., amounted to £867 and a commission of £260. After deducting these amounts and adding sundry small receipts, there is a total of £4,082 net receipts, against £4,428 last year. The net profit for the year is £1,733, as against £2,125. Adding £152 brought forward, there is a disposable balance of £1,885, which enables the directors to recommend a dividend of 6 per cent. upon the preference shares, absorbing £1,558, leaving a balance of £327 to be carried forward. With the exception of £41 unclaimed dividends, there are no debts, debentures, mortgages or any other encumbrances whatever upon the company's property, and the buildings, rolling stock, boilers, engines, electrical equipment and permanent way have been maintained in a high state of efficiency out of revenue. No accident of any kind has happened to either passengers or property.

Hong Kong Tramway Co., Ltd.

Mr. E. C. Morgan (chairman) presided on May 15th at the offices, 19, St. Swithin's Lane, E.C., over the ordinary general meeting of this company.

In moving the adoption of the report (see Electrical Review, page 812), the Chairman said the contents were of more than usual interest. Towards the end of last year the Government of Hong Kong approached them with a proposal that they should refuse to accept the Chinese subsidiary coinage in payment of fares upon the tramways, it being understood that the Government would support them in connection with the circumstances which might ensue from the adoption of so drastic a measure. The primary result of their action was rioting and boycott on the part of the Chinese, which soon caused the comparison of the receipts with those before the boycott took place to assume threatening proportions. After a time, however, the board were able to reassure the debenture and shareholders by the issue of a circular stating that the Hong Kong Government had obtained the consent of the Colonial Office to $30,000 in compensation up to December 31st, 1912, pending a settlement of the basis upon which the compensation might ultimately be paid. This circular was sent out on January 21st, 1913, when the full force of the boycott was beginning to abate, although it was still, and for some time afterwards detrimental to, their interests. Happily, however, the most recent traffic returns were satisfactory, and the manager advised them that the coinage and boycott question now affected the receipts very little. To fix the amount of loss sustained by the company in consequence of the boycott was a matter of great difficulty, owing to the alterations in surrounding circumstances. As an instance, he might mention that during the period with which they were now comparing, the traffic was abnormal, owing to the fact that the revolution in China had brought a number of refugees to Hong Kong, who, now that peace was restored, had presumably returned to their homes. However, the matter of compensation was still under discussion by the Government, and they were striving to obtain all they could properly claim, as their loss due to their compliance with the Government's request in the matter of the currency. In the abstracts attached to the report they would have noticed under the heading of maintenance and repairs an increase of about £4,000, consisting mainly of improvements in roadway and track, which should reduce expenditure in the future. He thought it must be conceded that the popularity of the system was shown by the satisfactory figure of the receipts, which, in spite of the fact that the exchange on discount was still a heavy burden, showed a good margin as compared with the expenses. In any case, it appeared that the accounts must be considered satisfactory, and much was due to the tactful management of their manager and agent, and also to the exertions of their staff, during the difficult times they had gone through.

Mr. W. J. C. Cutbill seconded the motion, and the report was adopted without discussion.

On the motion of the Chairman, a final dividend of 10 per cent. was declared, making 7½ per cent. for the year.

The Chairman subsequently moved a hearty vote of thanks to the agents and manager and staff for the efficient way in which they had conducted the company's affairs in Hong Kong. He remarked that they had had troublous times, and brick-bats were not altogether absent from the proceedings at times.

Mr. R. Miller seconded the motion, and it was carried.

Merthyr Electric Traction and Lighting Co., Ltd.

The report for 1912 states that the capital expenditure now stands at £127,613. During the year a further issue was made of 2,000 ordinary shares of £5 each at par, upon which £3 per share has been paid up. The total revenue from all sources amounted to £21,205, as compared with £20,716 for the preceding year. The expenses amounted to £12,421, compared with £11,837 for 1911. The net revenue is £95 less than in 1911, a satisfactory result having regard to the restriction of trade in the district caused by the coal strike. After deducting all expenses chargeable to revenue (including £2,178 for debenture interest) and charging revenue account with £1,500 provision for renewals, there remains a surplus of £5,106 plus £852 brought forward. The directors propose to place to reserve £1,500, dividend on the preference shares £1,500, dividend at the rate of 6 per cent. per annum on the ordinary shares £2,029, carrying forward £929.

The results from the year's working of the electricity supply undertaking show continued progress. The gross receipts from the electric supply section of the undertaking amounted to £10,136, and the working expenses to £3,854. The receipts for 1912 exceeded those for 1911 by £940, whilst the working expenses increased by £340. The total number of units sold for lighting and power purposes was 638,793, which, compared with the previous year's figure of 568,173, shows an increase of over 12 per cent. The number of consumers at December 31st last, was 858, as compared with 758 at the corresponding date in the previous year, being an increase of over 13 per cent. The extension of the high-tension mains to enable a supply of electricity to be given in the towns of Merthyr Vale, Aberfan and Treharris, referred to in the last report, has been carried out during the year, and a supply was inaugurated on October 17th last, with satisfactory results.

The gross receipts derived from the working of the light railway undertaking amounted to £10,853, being a decrease of £553, and the working expenses amounted to £6,509, an increase of £55.

Since the close of the year an agreement has been entered into with the Merthyr Corporation under which the company has agreed to pave the whole of certain of the roadways in the lower part of the town with wood setts, and repair the same, and to construct an extension of the line to the Morning Sun in Cefn Coed; in consideration for which the Corporation have agreed to defer their option of purchase of both the light railway and electric supply undertakings from 1924 to 1934, being 10 years beyond the time specified in the Merthyr Tydfil Light Railway Order of 1899, and the Merthyr Tydfil Electric Lighting Order of 1899. It is intended to make an early application to the Board of Trade for amending orders with a view to obtaining the necessary statutory powers to enable the agreement to be carried out.

	1911.	1912.
Units generated	1,265,264	1,423,988
Units sold—Public lamps	150,060	153,505
To traction section	396,955	396,512
Private consumers by meters	418,118	485,288
Total sold	954,128	1,035,305
Used on works	200,913	240,622
Quantity accounted for	1,155,040	1,275,927
Not accounted for	110,164	148,011
Total max. supply demanded—Traction	321 kw.	400 kw.
Lighting	432 kw.	498 kw.

Mr. G. J. Somerville (chairman) presided on Monday at the offices of the Electrical Federation, Kingsway, W.C., over the sixteenth ordinary general meeting.

In moving the adoption of the above report, the Chairman said thatnearly the whole of the considerable increase of £11,128 in the capital expenditure was upon the electric supply undertaking. This was to provide an electric supply for the districts of Merthyr Vale, Aberfan and Treharris. The supply was only inaugurated on August 17th, so that the results of this expenditure did not fall into the revenue account for more than two and a half months. They were, however, satisfactory, and for the first quarter of this year they continued to be satisfactory, and the profit had been increased during this period of three months to the extent of £380. The traffic receipts on the light railways showed a considerable falling off during last year on account of the coal strike which affected Merthyr perhaps more than any other part of the country, and left the town very short of money for the remaining part of the year. The deficit in traffic alone amounted to over £500, but now that Merthyr had got into ordinary conditions again, the traffics had again shown a considerable increase, and during the first four months of this year they had more than made up the leeway—there being an increase in traffic receipts of £597 for the first four months of the present year. Altogether, taking into account

the adverse circumstances, the report of last year was quite as good as they could expect, and he could also say that this year promised a much better return than the previous year.

MR. C. G. TEGETMEIER seconded the motion, and the report was adopted without discussion.

Urban Electric Supply Co., Ltd.

THE directors' report for the year ended December 31st, 1912, states that the gross profits amount to £57,466, as compared with £50,876 a year ago, and after deducting the expenses shown in the profit and loss account, a balance of £54,265 is carried down to net profit and loss account. In the latter account the amounts required for interest and debenture stock redemption absorb £36,182, leaving an available balance, including £414 brought forward, of £18,496. Of this there is to be applied to reserve for depreciation £10,000, to dividend of 3 per cent. for the year on the preference shares £7,500, carrying forward £996. The balance of the 5 per cent. dividend on the preference shares will be satisfied by funded dividend certificates in accordance with the terms of the resolution passed and confirmed at the extraordinary general meetings held on February 2nd and 17th, 1912. Consequent on the reduction of capital sanctioned by the Court on March 12th, 1912, a capital reserve fund of £160,000 appears in the balance-sheet, off which has been written cost of plant dismantled and expenses relating to reduction of capital. The usual comparative statement, showing the profits earned at the various works, is appended. The following table shows the equivalent in 33-watt lamps connected and the gross profits at December 31st of each year :—

	1910.	1911.	1912.	1910.	1911.	1912.
Hawick	57,681	65,599	70,251	£4,771	£4,840	£4,788
Stamford	33,563	32,411	34,515	1,626	1,467	1,529
Weybridge and Walton	61,861	66,186	71,862	6,124	6,040	5,963
Godalming	29,612	32,371	35,518	2,982	3,396	3,416
Twickenham	103,371	113,068	129,466	10,150	10,959	11,012
Dartmouth	23,734	24,543	25,274	2,607	2,637	2,410
Camborne and Redruth and Cornwall	75,041	105 178	146,954	7,620	8,727	13,869
Newton Abbot	18,570	20,719	22,761	1,467	1,695	2,008
Grantham	37,286	39,209	40,586	2,498	2,648	3,132
Glossop	27,588	28,782	33 125	2,641	2,983	2,898
Berwick	19,821	21,688	23,831	1,466	1,565	1,615
Caterham	14,813	16 563	48 426	1,142	1,635	1,927
Newbury	22,269	23,575	24,926	2,158	2,259	2,873
Totals	525,160	589,737	677,495	£47,254	£50,850	£57,486
	Lamps.			Gross profit.		

Lisbon Electric Tramways, Ltd.

MR. LUDWIG BREITMEYER (chairman) presided on May 14th at the offices, 1, London Wall Buildings, E.C., over the fifteenth ordinary general meeting of this company.

In moving the adoption of the report (see ELECTRICAL REVIEW, page 779), the CHAIRMAN said that during the year the tramways had suffered from two stoppages of the service owing to strikes. One was of short duration in January, but a much more serious one took place at the end of May, which lasted for over three weeks, when the whole of the service was suspended, the power house was shut down, and not a single car ran in the streets. The result of the first strike was a loss in receipts of about 8½ contos, and the 29 days' strike in May resulted in a loss of under 110 contos, making altogether 118 contos. Allowing also for the average increase of traffic during the time of stoppage, as shown over the rest of the year, this would bring the total loss in receipts to about 125 contos, or, say, £25,000, which was a heavy sacrifice, but was a small burden for the shareholders to bear, considering the grave issues that were forced upon them, and which had to be resisted with the utmost determination and at any cost. Turning to the actual figures of the traffic movement, the passengers carried were 50,411,963, against 51,852,719 in 1911, a decrease of 1,440,756. The earnings amounted to 1,640,410·685 milrees, as against 1,676,302·658 milrees in 1911, a difference of only 35,892·607 milrees, or about £7,000 in English money. He might pass over the three days' strike in January, brought about through the intrigues of syndicalism, and in which their employés were not involved, being forced against their desire to stop work. The 29 days' strike from May 29th to June 24th was, however, a serious business. The management was faced with an absolutely clear issue—either to submit to its employés on an important question of discipline or to stand firm. The management, with the concurrence and, under the instructions, of the London board, refused to yield to the unreasonable demands of the men, and, as the result of this firm attitude, the men returned to work on June 24th, and since then the general manager's relations with the employés had not been disturbed, and, of course, they had no other desire than that they should remain so. It was a critical time for the company, and their thanks were due to Mr. Giles, the general manager, and to Mr. Sousa, the assistant manager, and all those of the staff who remained loyal to the company. From the accounts they would see that the balance of profit available was £107,912, from which the usual reserves, amounting to £40,000, had been deducted, and the preference dividend, amounting to £25,533, had been paid, and also the interim dividend of 3 per cent., amounting to £19,020. This left a balance of £22,658 to be dealt with, and the directors now recommended a final dividend of 3 per cent., making a total of 6 per cent. for the year, and absorbing £19,020. The balance of £3,637 it was proposed to carry forward. As the shareholders knew, they did not take any part in politics. They were simply a business undertaking, but it was impossible to be indifferent to the course of public events in Lisbon, and the present state of unrest could not but continue to be a cause of anxiety. The gratifying feature was that their tramways business maintained the even tenour of its way, with increased development, in spite of the unrest which, unfortunately, still existed. Now that the contract with the Municipality of Lisbon for the reconstruction and electrification of the Nova Companhia dos Ascensores Mechanicos de Lisboa had been completed, the work was being pushed on with all speed, and when completed would be a further favourable factor in the development of the traffic.

MR. J. B. TAYLOR seconded the motion, which was carried without discussion.

It was agreed that the remuneration of the directors for the year ending December 31st, 1912, be fixed at £2,500.

The CHAIRMAN expressed the hope that next year they would have a better balance-sheet, for it looked as if they would have no strikes, although one never knew what might happen.

British Thomson-Houston Co., Ltd.

THE report of directors for 1912 reads as follows :—

Works at Rugby.—The buildings and machinery of the company have been maintained in first-class condition during the year. A number of extensions in progress were mentioned in the last annual report, the most important being a four-floor building to be used for railway work and other manufacturing purposes. This latter building is now completed. On the new tract of land mentioned in last year's report, a one-storey building is in course of erection, to be used for the manufacture of heavy apparatus, also another building for pattern storage which at present will be one storey high, but is so arranged that it can be easily converted into a three or four-storey building.

Works at Coventry.—These works are now in full operation.

Works at Willesden, London.—It was mentioned in the last annual report that we were erecting a factory at Willesden for the manufacture of Mazda lamps. Since then, however, improved methods of making these lamps have enabled us to very largely increase the output of the Rugby lamp factory, and on account of the rapid expansion of work in other departments, it has been decided to utilise the Willesden factory, which is admirably suited for the purpose, as a switchboard factory.

Metallic-Filament Lamps.—The business in Mazda drawn-wire lamps during the year has shown a further increase.

Curtis Steam Turbines.—The turbine business of the company continues to show satisfactory results, and the company had a larger number on order and in course of manufacture at December 31st last than ever before.

The company's operations were severely handicapped by the coal strike, which occurred at the beginning of 1912. Although ample coal reserves had been accumulated at the Rugby works, deliveries of raw material, such as iron, steel, &c., required in the manufacturing business of the company, were seriously affected, and the company's output very considerably restricted thereby.

Debenture Redemption.—Under the terms of the trust deed securing the issue of the company's debenture stock, the company has this year to pay to the trustees the sum of £4,452, to be applied by them in redeeming debenture stock at 105 per cent. by drawings. Since the closing of the books, debenture stock of the par value of £2,000 has been redeemed, making the total par value of stock retired to date £19,305, and a further £2,240 will be redeemed before the end of the year, making £21,545 in all.

The directors have followed their usual practice in making reserves to cover risks in connection with bad debts, depreciation of shares held by the company, and other contingencies.

The balance-sheet, after paying interest on debenture stock and loans, shows a profit of £31,000, and the directors recommend that this should be appropriated as shown in the profit and loss account —£20,000 to depreciation of plant account ; £1,696 to depreciation of office furniture and store-room equipments ; £6,270 to depreciation of apparatus, supplies, meters, &c. ; £1,825 to special experimental expenses written off—leaving a balance of £1,209. This, together with the previous year's balance, makes a total amount to be carried forward of £8,590.

The meeting is to be held at 83, Cannon Street, E.C., on May 28th.

Hastings and District Electric Tramways Co., Ltd.

THE directors' report for the year ended December, 1912, shows that there was a decrease in the traffic receipts of £2,433 due to the coal strike and to weather conditions during the holiday season. The expenditure side of the account, as compared with last year, shows a net increase of £1,120. This is chiefly due to the enhanced cost of fuel, and to abnormal expenditure on the permanent way, a part of which, amounting to £1,990, has been debited to depreciation account. The revenue account, after crediting receipts aggregating £17,491, and debiting administration expenses amounting to £1,431, shows a balance of £16,060 plus £2,177 brought forward, and deducting £10,387 for interest charges, there remains available £7,851. Out of this amount an interim dividend of 3 per cent. on the preference shares was distributed in October last, and it is now proposed a pay a final dividend of 3 per cent., making the full 6 per cent. for the year, and to carry forward the balance of £3,051.

"The attention of the Board of Trade having been called by the Hastings Corporation to the unsatisfactory results obtained from

the use of the Dolter surface contact system on the Front line, the directors considered it necessary to promote a Bill in Parliament for the substitution of the overhead trolley system, by which all the other sections of the line are worked. They regret, however, to report that the Bill has been thrown out by the House of Lords' Committee. As the company has in the meantime been notified by the Board of Trade of its intention to call for the removal of the Dolter system, the board is carefully considering the alternative system to be adopted to meet the requirements of the public service, and, at the same time, to safeguard the interests of the shareholders."

Mr. E. C. Morgan, the chairman, relinquished that position last March owing to ill-health, and the directors appointed Mr. George Kitchin as his successor. Mr. Morgan continues as a member of the board.

The annual meeting was held on Tuesday at the offices, 1, Queen Victoria Street, E.C. MR. GEORGE KITCHIN, who presided, said that power expenses showed an increase of £369, due entirely to the increased cost of coal. Traffic expenses, on the other hand, showed a decrease of £859, owing to a decrease in the mileage run. Part of this decrease was compulsory; it became necessary to largely reduce the service during the coal strike; and part was voluntary, due to the suppression of unremunerative services. Consequent upon the continuance of the work of putting the track into first-class order, the greater part of the cost of which had come into the 1912 accounts, a sum of £12,980 had been spent upon maintenance and repairs. Of this sum £1,990 was in the nature of capital expenditure, and had been debited to depreciation account. The balance £10,999 had been debited to revenue, and showed an increase of £1,415 over last year, which again showed an increase of £1,143 over 1910. The effect of this heavy expenditure should be apparent in the improved conditions of running, and the reduction of maintenance costs to a more normal figure. General expenses showed an advance of £194, mainly due to an increase from £325 to £400 per mile of the charge made by the Corporation for the wayleave on the front line. The income and traffic showed a decrease of £2,433 due, first, to the coal strike; secondly, to the very unsettled weather conditions The net result was an available balance of £7,850. From this they had already paid an interim dividend of 3 per cent. on the preference shares, and they now proposed to pay a further 3 per cent., making the full 6 per cent. for the year, and to carry forward £3,051. Proceeding to refer to the paragraph in the report dealing with the Bill which the directors considered it necessary to promote in Parliament for the substitution of the overhead trolley system on the front line for the surface contact system at present in use, the Chairman said he would like to remind them that there was a provision in their 1903 Act which compelled them to work the front line by self-propelled cars, or other system approved by the Corporation, other than the overhead system. After careful examination, the Dolter surface contact was installed in the year 1907, with the approval of the Corporation, as the best system that could be found to meet the case. From the outset it had caused them anxiety, but by sparing neither trouble nor expense, they had been able to work it with sufficient success to provide for the carrying of over 3,000,000 passengers annually on the front line. They were, however, quite aware of the various defects inherent in the system which developed in the working and became accentuated as time went on, and they quite anticipated that sooner or later this would result in a call for its discontinuance. It had been installed in Torquay and Mexborough, but in both places had been condemned and removed, while the company which owned the patents had abandoned them as useless. At the same time the directors were strongly of opinion that the only really satisfactory system which could be substituted for the Dolter was the overhead. All the other lines of the company had been successfully worked by this system, but before the substitution could be carried out, it was necessary to obtain the authorisation of Parliament, as not only was the company precluded from installing the overhead system, but by the Act of 1903 the Corporation was estopped from sanctioning its use. In 1911, finding that the Dolter system was deteriorating, they decided to apply to Parliament, but before depositing the Bill they approached the Corporation with a view to obtaining their assent, as they wished to work in co-operation with them, and, if possible, to avoid the heavy expense involved in a contested Bill. On receipt of their refusal they decided not to proceed with the Bill at that time. In April last year, however, the Corporation called upon the Board of Trade for a report upon the working of the Dolter system. The Board of Trade sent down Major Pringle, who inspected the line and furnished such a report, as, in the directors' opinion, confirmed the company in their contention that the defects existing in the system were inherent and of a nature beyond the control of the company. The report was to the effect that though satisfied that the company had done its best to work and maintain the system, the Board of Trade considered that the result had not proved satisfactory, and that it might be necessary at some future date to call for the discontinuance of the system in the interests of public safety. In the interests of the shareholders it became necessary to seek Parliamentary powers to substitute overhead for the surface contact system. They had used every endeavour, though unsuccessfully, to find some other system which would have been possible under their existing Acts, and which should be satisfactory to the public in its working, and to the shareholders in its results. They, therefore, again appealed to the Corporation not to oppose the Bill, and the directors travelled down to Hastings accompanied by Mr. Waller, their engineer, and had an interview with the Parliamentary Committee of the Corporation, in order to endeavour to induce them to modify their attitude, but they finally decided to oppose them. The frontagers also raised a fund and briefed counsel to fight the Bill before the House of Lords' Committee, and, in the event that Committee decided that the Bill must not proceed. In the meantime, the Board of Trade had advised them that they proposed, at the expiration of six months from March 5th last, to issue an order requiring the company to cease the use of the Dolter system. They found themselves, therefore, in a difficult position, and they were now considering, with their consulting engineers, what was the best system to install—the overhead being forbidden and the Dolter condemned. They had to consider the interests both of the shareholders and the public; indeed, in his view, their interests were really identical. The company could not earn dividends unless it served the public well, and the public could not be well served by a company that could not earn dividends for its shareholders. As he told them last year, their Cooden extension promised to be remunerative soon, owing to the building, &c., going on under the auspices of Earl de la Warr, and lately, he was glad to say there were really some signs that Hastings and its Corporation were waking up, and were going at last to do something to bring their interesting, but sleepy, old town up to date. To that end this company would be glad to assist, and he could only hope that the Corporation would meet their efforts for the good of the town with a little more practical sympathy, and a little less of the spirit of the gentleman who insisted on his pound of flesh. Better relations between them would be for the good of the town, as well as of the people who had put up their money to provide Hastings with a really excellent service of tramways at so serious a financial loss to themselves up to the present. To establish these more friendly relations was the desire of the board, and to that end they would direct their efforts.

MR. E. C. MORGAN seconded the motion.

Replying to a shareholder, the CHAIRMAN said that the board had often wondered why the Corporation had taken up so hostile and so impossible an attitude towards the company, looking to the fact that the putting of the tramways in Hastings, which had been done with their shareholders' money, had been of considerable benefit to the town at large. They were endeavouring to introduce a better feeling between the company and the Corporation. There was no doubt that they both had the interests of the town at heart, and if the town was doing well the tramway company would be among the first to reap the benefits. If, therefore, they could in any way assist the Corporation to improve the town, they would do so, but they looked for a little more kindly feeling and a little more reasonable attitude than they had received in the past from the Corporation. They had for a considerable time been considering the question of petrol motors in connection with their cars, and only the previous day their consulting engineer witnessed some trials in the east end of a new petrol-electric tramcar, which the L.C.C. were proposing to install in the Hackney district, where they could not have the overhead system owing to the opposition of local authorities, and where they found the conduit system too expensive. Their difficulty was to find a system which would enable them to continue the through running between Bexhill and Hastings.

The report was adopted.

Continental.—FRANCE.—La Société de l'Electricité de Rheims is the name of a new company which has just been formed at Rheims, with a capital of £80,000.

A new company has lately been formed at Aigueville (Savoy), with a capital of £50,000, and the title La Société des Acieries Electriques d'Aigueville, to carry on a plant for the electrical production of steel.

RUSSIA.—La Société des Usines Electrotechniques Siemens et Halske, of St. Petersburg, reports a profit of 636,388 roubles for the last financial year; a dividend of 6 per cent. is again being declared.

STOCKS AND SHARES.

Tuesday Evening.

APART from the rush to apply for the new Chinese loan, the principal feature in all the markets of the House is the absence of business. Like King Charles's head in Mr. Dick's book, the Balkans trouble crops up with a pertinacity worthy of a better cause. At least, the Stock Exchange says it is the Balkans affair which is acting as a drag upon clients' financial proclivities. Certainly there is little speculation going on; and, notwithstanding all the money which has been made in trade, the investment business of the Stock Exchange proceeds on very jogtrot lines.

See-sawing in fashion somewhat aimless, the Home Railway market this week has leaned to the dull side. There are apprehensions of difficulties on several of the steam lines, the Great Northern, in particular, being favoured with protests from some of its men that one of their number has been unjustly treated. Once more it becomes apparent that a lull in labour difficulties is not likely to be more than temporary; and so long as the market is subject to these spasms, all the increases in the world will not suffice to encourage substantial buying of the stocks. The soundness of this argument is underlined by the reaction that followed

upon a rally in Home Rails when the Great Northern's differences were composed.

Of the Undergrounds, Metropolitans hardened to 53¾, but came back to 52½, and Districts, after going above 40, eased off again to 39¼, leaving falls on the week. Underground Electric Railways shares fell 5s. to 4¼. The Company's 1s. shares are quiet and steady, speculation in them having died out to a considerable extent. The special settlement took place this week in the new London and Suburban shares, and the Preference made up at 14s. 3d., the Ordinary at 8s. 3d., and the Debentures at 83. These prices compared very favourably with those which were current about 10 days ago, when the Preference fell back to half-a-guinea and the Ordinary to 6s. 6d. The Company is proposing to exchange its own securities for the shares of the South Metropolitan Electric Tramways Company, offering £125 of Preference for £100 of the South Metropolitan Tramways Preference. The latter for a long time past have enjoyed no free market, whereas the London and Suburban have been readily dealt in since they first appeared, and this consideration will probably weigh with some of the South Metropolitan proprietors in inducing them to make the exchange. Thus another step is taken in the direction of fusing into one control the passenger traffic of the Metropolis. British Electric Traction issues rallied to some extent, in spite of the trouble which is being experienced in Birmingham in connection with the threatened tramway strike.

London Electricity shares are disposed to weaken a little. London Electric Ordinary shares went back to 30s.; Charing Cross Ordinary and Preference are easier, and Westminsters fell ½. The improvements in Edmundson's issues are maintained. The Urban report has not affected prices. An important issue of 5 per cent. Debenture stock is pending by the Midland Electric Corporation, and underwriting arrangements have been in progress this week. The money is required partly to pay off the existing 4½ per cent. Debenture stock, which becomes redeemable on June 30th next at 102½. Advance particulars show the stock to be admirably secured. Underwriters, we understand, receive a commission of 1½ per cent.

The Mexican news is again of a very mixed character, and proprietors of securities connected with Mexico are puzzled to know what they ought to do in the present situation. To the outside observer it would appear that affairs there will get straightened out in due time, although this has been a much longer process than anybody expected it would be. There can be no doubt that Mexico will go ahead strongly so soon as the revolutionary spirit is quenched, but in the meantime a good deal of patience is necessary. While the market in the common shares is somewhat dull, prices of the prior charge securities are also being lowered by way of precaution. There are falls this week in Mexican Electric Light 5 per cent. bonds, Pachuca bonds, Montereys and one or two other similar issues. The market, as a whole, is subject to general influences, too, and there is the forthcoming issue of Brazilian Traction Preferred shares to give an added touch of depression to this department. Brazil Tractions themselves have gone up to 97½. It may be observed, incidentally, that things Brazilian are not in great favour at present, owing partly to the heavy fall in the price of raw rubber, which the alarmists declare may, if persevered in, have a pronounced effect upon the revenues of the Federal Government.

The telegraph market tends, if anything, to the lower side. Anglo-American Telegraph Preferred and Deferred continue to be depressed, and there still seems to be "deceased" stock floating about. The dullness is, no doubt, accentuated by the stagnation prevailing in American circles, the New York Stock Exchange apparently being worse off for business than London is. The question is revived as to whether the three classes of Anglo-American Telegraph stocks could not be unified. The difficulty, however, seems to lie in the off-chance of the relations between the Anglo-American Telegraph Company being dissolved from those of the Western Union, as might conceivably happen if the latter were to be adjudged a monopoly in restraint of trade under the United States laws, and, therefore, it seems necessary that the identity of the three Anglo issues should be separately preserved. Eastern Telegraphs are a little lower, but, on the other hand, Westerns rose 5s. to 13½, which placed them very much on the same level as Eastern Extensions shares and Eastern Telegraph stock. Great Northerns continue to improve, gaining 10s. Indo-Europeans are *ex* £2 12s. 6d. dividend, allowing for which there is no net change in the quotation. Various other securities are quoted *ex* dividend. Marconis have receded still further. Since last we wrote, the price has been down to 4, from which it picked up to $\frac{15}{16}$, leaving ⅛ fall on the week. There is nothing much going on in National Telephone Deferred, the price keeping about 21. West Coast of America shares are unaffected by the issue of the report, the first since the expiration of the Portuguese guarantee. The carry-forward is reduced in consequence of this, otherwise there is not much change.

Reuters, old and new, lost ½, despite a good report and the maintenance of the dividend on both classes of shares. The banking business is to be separated from the other part, and this seems to be disliked in some quarters.

Copper merchants tell us that orders continue to come in at a rapid pace from their electrical manufacturing customers, but the activity in manufacturing circles which this suggests is not reflected in the share market. British Thomson-Houston Debenture is a point up, and this is practically the only quotable change. Babcock & Wilcox Preference are quoted *ex* the rights to apply for the issue of Second Preference shares, valued for Stock Exchange purposes at $\frac{1}{16}$ premium. Rubber shares relapsed after their brief bout of strength, and business in the market is of meagre proportions

MARKET QUOTATIONS.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general, and may vary according to quantities and other circumstances.

Wednesday, May 21st.

CHEMICALS, &c.		Latest Price.	Fortnight's Inc. or Dec
a Acid, Hydrochloric	per cwt.	5/-	..
a „ Nitric	„	22/-	..
a „ Oxalic	per lb.	2¾d.	..
a „ Sulphuric	per cwt.	5/6	..
a Ammoniac Sal	„	42/-	..
a Ammonia, Muriate (large crystal)	per ton	£29 10	..
a Bleaching powder	„	£6 5	..
a Bisulphide of Carbon	„	£18	..
a Borax	„	£17 10	..
a Copper Sulphate	„	£23 5	..
a Lead, Nitrate	„	£27	..
a „ White Sugar	„	£25 5	..
a „ Peroxide	„	£32	..
c Methylated Spirit	per gal.	2/6	..
a Potassium, Bichromate, in casks	per lb.	8½d.	..
a Potash, Caustic (88/90 %)	per ton	£22 10	..
a „ Chlorate	per lb.	8½d.	..
a „ Perchlorate	„	4½d.	..
a Potassium, Cyanide (98/100 %) (for mining purposes only)	„	7½d.	..
a Shellac	per cwt.	82/6	2/6 inc.
a Sulphate of Magnesia	per ton	£4 10	..
a Sulphur, Sublimed Flowers	„	£6 10	..
a „ Recovered	„	£5 10	..
a „ Lump	„	£5	..
a Soda, Caustic (white 70/72 %)	„	£10 5	..
a „ Chlorate	per lb.	3⅝d.	..
a „ Crystals	per ton	£3 5	..
a Sodium Bichromate, casks	per lb.	3d.	..
METALS, &c.			
b Aluminium Ingots, in ton lots	per ton	£95	..
b „ Wire, in ton lots (1 to 14 S.W.G.)	„	£112	..
b „ Sheet, in ton lots	„	£126	..
p Babbitt's metal ingots	„	£50 to £221	..
c Brass (rolled metal 2" to 12" basis)	per lb.	8½d.	¼d. dec.
c „ Tube (brazed)	„	10⅝d.	⅛d. inc.
c „ „ (solid drawn)	„	9⅜d.	⅛d. inc.
c „ Wire, basis	„	8⅝d.	⅛d. dec.
c Copper Tubes (brazed)	„	11⅜d.	1⅛d. inc.
c „ „ (solid drawn)	„	11½d.	1⅛d. inc.
g „ Bars (best selected)	per ton	£85	..
g „ Sheet	„	£85	..
g „ Rod	„	£85	..
d „ (Electrolytic) Bars	„	£73 15	£1 5 inc.
d „ „ Sheets	„	£90 15	£1 5 inc.
d „ „ Rods	„	£78 15	£1 5 inc.
d „ „ H.C. Wire	per lb.	9⅜d.	⅛d. inc.
f Ebonite Rod	„	4/6	..
f „ Sheet	„	4/-	..
n German Silver Wire	„	1/10	..
h Gutta-percha, fine	„	7/- to 8/-	..
h India-rubber, Para fine	„	3/10	3½d. inc.
i Iron Pig (Cleveland warrants)	per ton	67/9	..
i „ Wire, galv. No. 8, P.O. qual.	„	£14	..
g Lead, English Pig	„	£19 5 to £19 10	£2 inc.
m Manganin Wire No. 28	per lb.	6/6	..
g Mercury	per bot.	£7 10	..
e Mica (in original cases) small	per lb.	6d. to 8s.	..
e „ „ „ medium	„	3/6 to 6/-	..
e „ „ „ large	„	7/6 to 11/-	..
o Nickel, sheet, wire, &c.	„	3/6 to 4/6 nom.	..
p Phosphor Bronze, plain castings	„	1/1 to 1/3½	..
p „ „ rolled bars & rods	„	1/0½ to 1/2	..
p „ „ rolled strip & sheet	„	1/2½ to 1/5½	..
o Platinum	per oz.	185/-	..
d Silicium Bronze Wire	per lb.	11d.	..
r Steel, Magnet, in bars	per ton	£55	..
g Tin, Block (English)	„	£224 to £225	£8 dec.
n „ Wire, Nos. 1 to 16	per lb.	2/9	..
p White Anti-friction Metals	per ton	£50 to £228	..
k Zinc, Sh't (Vieille Montagne bnd.)	„	£29	..

Quotations supplied by—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakspeare.
h Edward Till & Co.
i Bolling & Lowe.
k Morris Ashby, Ltd.
l Richard Johnson & Nephew, Ltd.
m W. T. Glover & Co., Ltd.
n P. Ormiston & Sons
o Johnson, Matthey & Co., Ltd.
p
r W. F. Dennis & Co.

West African Telegraph Co., Ltd.—The directors' report for the year ended December 31st, 1912, states that the revenue amounted to £46,603, from which is deducted £17,091 for the ordinary expenses, and £6,837 for expenditure relating to maintenance of cables and income-tax abroad, leaving £22,674, plus £987 brought forward, making £23,661. £1,323 has been provided for income-tax, £13,000 has been transferred to general reserve fund, and an interim dividend of 2 per cent. (free of income-tax), absorbing £4,622, was paid on December 1st. The directors recommend a final dividend of 2 per cent. (free of income-tax), on and after May 21st, making, with the interim distribution, 4 per cent. for the year, the balance of £94 being carried forward. The meeting is called for May 21st.

Cleveland and Durham County Electric Power Co.—A dividend of 3½ per cent. for the year to December 31st is announced, carrying forward £148.

SHARE LIST OF ELECTRICAL COMPANIES.

ENGLISH ELECTRICITY SUPPLY AND POWER COMPANIES.

NAME.	Stock or Share.	Dividends for		Closing Quotations May 20th.	Rise + or Fall —	Present Yield p.c.
	*	1911.	1912.			£ s. d.
Bournemouth & Poole, Ord.	10	5½	6	9¾ — 10½	..	5 18 5
Do. 4½ % Pref.	10	4½	4½	8¾ — 9½	..	4 14 9
Do. Second 6 % Pref.	10	6	6	10 — 10½	..	5 14 3
Do. 4½ % Deb. Stock	Stock	4½	4½	96 — 98	..	4 11 10
Brompton & Kensington, Ord.	5	10	10	8⅞ — 9⅜	..	5 6 8
Do. 7 % Cum. Pref.	5	7	7	8⅜ — 8⅝	..	8 18 10
Central Electric Supply, 4 % Guar. Deb.	100	4	4	95 — 98	..	4 1 8
Charing Cross, West End & City	5	5	5†	4⅛ — 4⅜	— ⅛	5 5 3
Do. 4½ % Cum. Pref.	5	4½	4½	4 5/16 — 4 7/16	+ 1/16	4 16 0
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	8¾ — 4½	..	5 9 1
Do. Do. 4 % Deb.	100	4	4	91½ — 93½	..	4 5 7
Chelsea, Ord.	5	5	4†	4⅜ — 5	..	5 0 0
Do. 4½ % Deb.	Stock	4½	4½	96 — 99	..	4 10 11
City of London, Ord.	10	8	9	16 — 17½	..	5 6 8
Do. 6 % Cum. Pref.	10	6	6	12 — 13	..	4 10 7
Do. 5 % Deb.	Stock	5	5	116 —120	..	4 3 4
Do. 4½ % Second Deb.	100	4½	4½	100 —102	..	4 8 3
County of London, Ord.	10	6	6	10½ — 11	..	5 9 1
Do. 6 % Pref.	10	6	6	11⅜ — 12½	— ⅛	4 19 0
Do. 4½ % Deb.	Stock	4½	4½	104 —106	..	4 5 0
Do. 4½ % Second Deb.	Stock	4½	4½	97 —100	..	4 10 0
Edmundson's, Ord.	£3	Nil	..	7/16 — 11/16	..	Nil
Do. 6 % Cum. Pref.	5	Nil	3	4½ — 4⅝	..	..
Do. 6% Non-Cum. Pref.	5	..	..	1⅛ — 2⅜	..	..
Do. 4½ % First Mort. Deb.	100	4½	4½	82½ — 85½	..	5 4 8
Folkestone	5	6	6	4⅝ — 5	..	6 0 0
Do. 5 % Cum. Pref.	5	5	5	4⅝ — 5	..	5 0 0
Do. 4½ % First Deb.	100	4½	4½	90 — 92	..	4 17 10
Hove	5	9	9†	7½ — 7¾	..	5 16 2
Kensington & Knightsbridge, Ord	5	9	8†	7⅜ — 7⅝	..	5 14 8
Do. 4 % Deb.	Stock	4	4	90 — 98	..	4 6 0
Kent Elec. Power, 4½ % Deb.	Stock	4½	4½	76 — 80	..	5 12 6
London Electric, Ord.	3	2¼	2½	1½ — 1⅝	— ⅛	4 7 9
Do. 6 % Pref.	5	6	6	4½ — 5⅛	..	5 17 1
Do. 4 % First Mort. Deb.	Stock	4	4	91 — 94	..	4 5 1
Metropolitan	5	4	4†	3½ — 3⅝	..	5 6 8
Do. 4½ % Cum. Pref.	5	4½	4½	4⅛ — 4⅜	..	4 17 4
Do. 4½ % First Mort. Deb.	Stock	4½	4½	98 —101	..	4 9 3
Do. 3½ % Mort. Deb.	Stock	3½	3½	82 — 85	..	4 2 4
Midland Electric Corporation 4½ % First Mort. Deb.	100	4½	4½	99 —102	..	4 8 3
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	98 —101	+ ½	4 19 0
Notting Hill, 6 % Non-Cum. Pref.	10	6	6	9½ — 10½	..	5 11 7
Oxford	5	7½	6†	5⅞ — 6⅛	..	5 13 9
St. James' and Pall Mall, Ord.	5	10	10†	8¾ — 9	..	5 11 1
Do. 7 % Pref.	5	7	7	6½ — 7½	..	4 16 7
Do. 3½ % Deb.	100	3½	3½	84 — 87	..	4 0 6
South London, Ord.	4	5	6	2⅞ — 3½	..	7 7 8
Do. 5 % First Mort. Deb.	100	5	5	98 —101	+ 1	4 19 0
South Metropolitan, 7 % Pref.	1	7	7	1 3/16 — 1 5/16	..	5 17 11
Do. 4½ % First Deb. Stock	100	4½	4½	96 — 99	..	4 10 6
Urban, Ord.	£3	Nil	..	1/16 — 3/16	..	..
Do. 5 % Cum. Pref.	5	2	‡	2⅜ — 3½	..	..
Do. 4½ % First Mort. Deb.	100	4½	4½	88 — 90	..	5 2 3
Westminster, Ord.	5	10	10	8¾ — 8⅞	— ⅛	5 12 8
Do. 4½ % Cum. Pref.	5	4½	4½	5 — 5⅛	..	4 8 9

COLONIAL AND FOREIGN ELECTRICITY SUPPLY AND POWER.

Adelaide, 6 % Pref.	5	6	6	5 — 5⅛	..	5 14 3
Calcutta, Ord.	5	8½	8½	6½ — 7 xd	..	5 19 4
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 17 7
Calgary Power, 1st Mort. Bds.	100	5	5	93½ — 95½	+ ½	5 5 3
Canadian Gen. El. Com.	$100	7	7	116 —119	..	5 17 8
Do. 7 % Pref.	$100	7	7	119 —124	..	5 13 0
Cordoba Lt., Power and T., Ord.	1	3		11/16 — 13/16	..	5 14 3
Do. 5 % Deb.	100	5	5	94 — 96	..	5 4 2
Elec. Lt. and P. of Cochabamba, 7 % Bonds	100	6	6	93½ — 95½	..	6 6
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	90 — 93	..	5 7 6
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	94½ — 96½	+ ½	5 4 1
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	..	3/16 — 5/16	..	Nil
Do. 6 % Pref.	1	6	6	13/16 — 15/16	..	8 6 8
Kaministiquia Power, 5 % G. Bs.	$500	5	5	100 —102	..	4 18 0
Madras, Ord.	£5	Nil	..	1⅜ — 1⅞	..	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	103 —106	..	4 14 4
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	80 — 83	—1	5 19 1
Mexican Lt. & Power, Common	$100	4	4†	74 — 77	—1	5 2 7
Do. 7 % Cum. Pref.	$100	7	7	100 —103 xd	..	6 16 0
Do. 5 % 1st Mort. Gold Bds.	..	5	5	91 — 93	..	5 7 6
Monterey Rly. Light & Power, 5 % 1st Mort. Deb.	100	5	5	80 — 83	—1	5 19 1
Montreal, Lt., H. and Power	$100	8	9†	229 —234	..	3 17 0
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5	5a	15 — 25	..	..
River Plate, Ord.	Stock	10	10	207 —217 xd	..	4 8 0
Do. 6 % Non-Cum. Pref.	Do.	6	6	102 —107 xd	..	5 9 1
Do. 5 % Deb. Stock	Do.	5	5	100 —102	..	4 18 0
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	100 —102	..	4 8 3
Shawinigan Water, Capital	$100	5	5	126 —140	—2	3 10 2
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	107 —109	..	4 11 9
Do. 4½ % Per. Deb.	Stock	4½	4½	100 —102 xd	..	4 7 0
Toronto Power, 4½ % Deb.	Do.	4½	4½	99 —101	..	4 9 0
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	91 — 94	..	5 6 5
Victoria Falls Power, Pref.	1	11½d.	17½d.	13/16 — 15/16	..	..
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	6	6	106 —108	..	5 11 1

TELEGRAPH AND TELEPHONE COMPANIES.

Amason Telegraph	10	4	4½†	6⅞ — 7⅜	..	6 2 0
Do. 5 % Deb. Red.	Stock	5	5	97 — 99	..	5 1 0
American Telep. & Teleg., Cap.	$100	8	8†	131 —133	—1	5 19 6
Do. Collat. Trust	$1000	4	4	92 — 94	..	4 5 1
Anglo-American Telegraph	Stock	8	8	64 — 66	— ½	4 10 11
Do. 6 % Pref.	Do.	6	6	109⅜ —110⅜	— ⅜	5 8 4
Do. Def.	Do.	80/-	80/-	23⅜ — 24½	— ½	6 4 4
Anglo-Portuguese Tel., 5 % Mort. Deb.	100	5	5	104 —106	+1	4 15 3
Chili Telephone	5	7	8	7¼ — 7⅜	..	5 1 1
Commercial Cable, Stg., 4% Deb.	Stock	4	4	85 — 87	..	4 12 0
Cuba Telegraph	10	6	6	8¾ — 9¼ xd	..	6 6 4
Do. 10 % Pref.	10	10	10	15½ — 16½ xd	..	5 17 8
Direct Spanish Telegraph, Ord.	5	4	4†	3½ — 3⅝	..	5 6 8
Do. 10 % Cum. Pref.	5	20	10	6½ — 7½	..	6 12 0
Direct United States Cable	10	5	4	6¼ — 6⅝ xd	..	5 18 6
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	99 —101	..	4 9 0
Eastern Telegraph, Ord. Stock	Stock	7	7†	185 —188	..	5 1 5
Do. 3½ % Pref. Stock	Do.	3½	3½	77 — 79	..	4 8 1
Do. 4 % Mort. Deb.	Do.	4	4	90 — 92	—1	4 7 0
Eastern Extension	10	7	7	13⅛ — 13⅜	..	5 2 7
Do. 4 % Deb.	Stock	4	4	93 — 95	—2	4 2 6
East and S. Africa Tel. 4 % Mt. Db. Mauritius Sub.	25	4	4	98½ — 100½ xd	..	3 11 7
Globe Telegraph and Trust	10	6	6†	10⅞ — 11½	..	5 6 8
Do. 6 % Pref.	10	6	6	12⅝ — 13⅛	..	4 11 4
Great Northern Telegraph	10	18	20	30½ — 32½	+ ½	6 3 1
Indo-European Telegraph	25	13	13	56½ — 58½ xd	..	5 6 7
Mackay Companies Common	100	5	5	83 — 86	..	5 16 3
Do. 4 % Cum. Pref.	$100	4	4	69 — 72	..	5 11 1
Marconi's Wireless Telegraph	1	20	..	4⅛ — 4½	— ⅛	4 14 1
Do. 7½ % Cum. Partic. Pref.	1	17	..	8⅝ — 9⅝	— ½	4 13 10
Monte Video Telephone, Ord.	1	6	6†	1 — 1⅛	..	5 6 8
Do. 5 % Pref.	1	5	5	3/16 — 5/16	..	5 14 3
New York Telep., 4½% Gen. Bnds.	100	4½	4½	97½ — 98½	..	4 11 2
Oriental Telep. and Elec.	1	8	10	1⅛ — 1 3/16 xd	..	5 3 8
Do. 6 % Cum. Pref.	1	6	6	1⅛ — 1 3/16 xd	+ 1/16	4 16 0
Do. 4 % Red. Deb.	Stock	4	4	88 — 90	..	4 8 11
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	98 —100	..	4 0 0
Reuter's	10	10	10†	11 — 11½	— ⅛	8 13 0
Do. New Shares	10	..	..	10 13/16 — 11 1/16	— ⅛	..
Submarine Cables Trust	Cert.	6	6	124 —127	..	4 14 6
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	96½ — 98½	..	4 11 5
United River Plate Telephone	5	8	8†	6⅞ — 7 xd	..	5 8 6
Do. 5 % Cum. Pref.	5	5	5	5⅛ — 5⅜	..	4 9 0
West Coast of America	2½	2½	..	1⅛ — 1½	..	4 3 4
Do. 4 % Debs., 1 to 500 guar. by Bras. Sub. Tel.	100	4	4	96 — 99	..	4 0 10
West India and Panama Teleg.	10	1½	1½	2⅞ — 3⅛ xd	..	3 18 5
Do. 6 % Cum. 1st Pref.	10	6	6	9¾ — 10½ xd	..	5 14 3
Do. 6 % Cum. 2nd Pref.	10	6	6	9⅛ — 9¾ xd	..	6 0 0
Do. 5 % Debs.	100	5	5	101 —103	..	4 17 1
Western Telegraph, Ltd.	10	7	7†	13½ — 13¾	+ ½	5 3 8
Do. 4 % Deb.	Stock	4	4	95 — 97	..	4 6 6
Western Union 4½ % Fdg. Bonds	$1000	4½	4½	96 — 99	..	4 11 0

*Unless otherwise stated, all shares are fully paid. a Paid in deferred interest warrants. † Interim Dividend. ‡ 8s. in Funded Dividend Certs.

CONTINUED ON NEXT PAGE.

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for 1911.	Dividends for 1912.	Closing Quotations May 20th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bath Trams, Pref. Ord.	1	Nil	Nil	⅜ — ½	..	Nil
Do. 5 % Pref.	1	5	5	1⅛ — 1⅜	..	6 8 1
Do. 4½ % Deb.	100	4½	4½	72 — 77	..	5 17 0
Brit. Elec. Trac., 6 % Pref. ..	100	..	..	8½ — 10½	..	..
Do. Do. Deferred ..	100	..	..	4 — 6	+ ½	..
Do. Do. 6 % Cum. Pr'f	100	6	6	84 — 87	+1	6 18 0
Do. 7 % Non-Cum. Pr'f.	100	..	..	34 — 38	+2½	..
Do. 5 % Perp. Deb. ..	100	5	5	88 — 92	..	5 8 8
Do. 4½ % 2nd Deb. ..	100	4½	4½	73 — 77 xd	..	5 17 0
Central London Railway, Ord.	100	8	8	82 — 84	..	‡4 15 8
Do. Pref.	100	4	4	84 — 86	..	‡4 13 0
Do. Def.	100	2	2	80 — 82	..	‡4 17 7
Do. 4 % Deb.	100	4	4	99 —101	..	3 19 3
City & S. London, 5 % Pref., 1891	100	5	5	100 —102	..	4 18 0
Do. Do. 1896	100	5	5	100 —102	..	4 18 0
Do. Do. 1901	100	5	5	99 —102	..	4 18 0
Do. Do. 1908	100	5	5	97 —100	..	5 0 0
Do. 4 % Deb.	100	4	4	92 — 94	+1	4 5 1
Great Northern & City, Pr'f. Ord	10	Nil	Nil	2⅛ — 2½	..	Nil
Hastings Trams, 6 % Pref. ..	1	6	6†	⅞ — 1⅛	..	7 7 8
Do. 4½ % Deb.	100	4½	4½	67 — 72	+ ½	6 5 0
sle of Thanet Trams, 5 % Pref.	5	2½	2½	2⅜ — 2⅝	..	4 15 3
Do. 4 % Deb.	100	4	4	75 — 80	..	5 0 0
Lancashire United, 5 % Deb. ..	100	5	5	78 — 80	..	6 5 0
London Elec. Railw'ys, 4 % Deb.	100	4	4	94 — 96	..	4 3 4
London United Trams, 5 % Pref.	10	Nil	..	4⅛ — 5	..	..
Do. 4 % Deb.	100	4	4	62 — 66	..	6 1 3

NAME.	Stock or Share.	Dividends for 1911.	Dividends for 1912.	Closing Quotations May 20th.	Rise + or Fall —	Present Yield p.c. £ s. d.
Metropolitan Railway Consol. ..	100	1⅞	1⅞	52⅛ — 52⅝	— ⅛	3 1 7
Do. Surplus Lands	100	2⅛	2⅛	62 — 64	..	4 6 0
Do. 3½ % Deb.	100	3½	3½	85 — 87	..	4 0 6
Do. 3½ % Pref.	100	3½	3½	83 — 85	..	4 2 4
Do. 3½ % Con. Pref.	100	3½	3½	81 — 83	..	4 4 4
Metropolitan District Ord. ..	100	Nil	Nil	39 — 39½	— ½	Nil
Do. 6 % Deb.	100	6	6	139 —141	..	4 5 1
Do. 4 % Deb.	100	4	4	94 — 96	..	4 3 4
Do. 4 % Prior Lien	100	4	4	97 — 99	..	4 0 10
Do. 4½ % First Pref.	100	4½	4½	85 — 87	..	5 1 2
Do. 3½ % Gtd.	100	3½	3½	75 — 77	..	4 10 11
Metropolitan Elec. Trams, Ord.	1	6	5⅞	3⅞ — 3¾	..	5 14 7
Do. 5 % Pref.	1	5	5	3⅞ — 4⅛	..	6 3 1
Do. 4½ % Deb.	100	4½	4½	87 — 91	..	4 18 11
Do. 5 % Deb.	100	5	5	91½ — 94½	..	5 5 10
Potteries, Ord.	1	3½	..	⅝ — 11/16	..	..
Do. 5 % Pref.	1	5	5	1⅛ — 1⅜	..	6 19 0
Do. 4½ % Deb.	100	4½	4½	82 — 85 xd	..	5 6 0
South Metro. Trams, 6 % Pref.	1	6	..	1⅛ — 1⅜	..	7 7 8
Do. 4 % Deb.	100	4	4	65 — 70	..	5 14 4
Underground Elec. Railways	10	..	..	4⅛ — 4⅜	— ⅛	Nil
Do. "A"	1/-	..	..	1/16 — 1/32	..	Nil
Do. 6% First Cum. Inc. Deb.	100	..	6	110 —112	+1	5 7 2
Do. 4½ % Bonds	100	4½	4½	97 — 99	..	4 10 11
Do. 6 % Income	100	1½	6 †	92 — 98	..	6 9 0
Yorkshire (West Riding), Ord.	5	Nil	..	¼ — ⅜	..	Nil
Do. 6 % Pref.	5	3	3†	2⅞ — 3	..	3 17 5
Do. 4½ % Deb.	100	4½	4½	81 — 85	..	5 6 0

ELECTRICAL RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref. ..	5	5½	5½	4⅞ — 5⅛	..	5 8 7
Do. 2nd Pref.	5	5½	5½	4⅞ — 4⅞	..	5 14 3
Do. 4 % Deb.	100	4	4	90⅛ — 92½	..	4 6 6
Do. 4½ % Deb.	100	4½	4½	98⅛ —100½	— ½	4 9 6
Do. 5 % Deb.	100	5	5	99 —101	..	4 19 0
Auckland Trams, 5 % Deb. ..	100	5	5	101 —103	..	4 17 1
Bombay Elec. S. & Trams, Pref.	10	6	6	10⅞ — 11⅛	..	5 4 4
Do. 4½ % Deb.	100	4½	4½	96 — 98	..	4 11 10
Do. 5 % 2nd Deb.	100	5	5	97 — 99	..	5 1 0
Brazilian Traction Light and Power	$100	..	6†	96¼—98⅛	+ ⅛	6 2 6
Brisbane Trams Invt., Ord. ..	5	8	8†	7⅛ — 7⅝	..	5 5 0
Do. 5 % Pref.	5	5	5	4⅞ — 5⅛	..	4 15 3
Do. 4½ % Deb.	100	4½	4½	100 —103	..	4 7 5
B. Columbia Elec. Rly., Def. ..	100	8	8†	130 —133	— 1	6 0 4
Do. Pref. Ord.	100	6	6	113 —116	— 1	5 3 7
Do. 5 % Pref.	100	5	5	103 —106	..	4 14 4
Do. 4½ % 1st Mort. Deb. ..	40	4½	4½	100 —103	..	4 7 5
Do. 4½ % Vancouver Deb. ..	100	4½	4½	100 —102	..	4 8 3
Do. 4½ % Con. Deb.	100	4½	4½	94½— 96½	..	4 8 1
Calcutta Trams, Ord.	5	7	5†	5⅝ — 6⅛	+ ⅛	5 12 0
Do. 5 % Pref.	5	5	5	4 15/16 — 5 1/16	..	4 17 7
Do. 4½ % Deb.	100	4½	4½	97½—100½	..	4 9 7
Cape Electric Trams	1	2½	..	⅛ — ⅜	..	..
City Buenos Aires Trams (1904)	5	5	5†	5⅛ — 5⅜ xd	..	4 11 0
Do. 4 % Deb.	100	4	4	93 — 97	— 2	4 2 6
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	90½ — 94½	..	5 5 10
Havana Elec. Rly., 5 % Bonds	$1000	5	5	97 —101	..	4 19 0
Kalgoorlie Elec. Trams	1	Nil	..	1/16 — 1/8	..	Nil
Do. 5 % A Deb.	100	5	5	83 — 88	..	5 13 8
Do. 6 % B Deb.	100	6	8	25 — 35	..	..

La Plata Elec. Trms, Ord. ..	1	Nil	..	7/16 — 9/16	— 1/32	..
Do. Pref.	1	6	..	1⅝ — 1⅞ xd	..	5 16 6
Lisbon Elec. Trams, Ord. ..	1	6	4½d.	1⅝ — 1¾ xd	..	4 9 8
Do. 6 % Pref.	1	6	6	1 — 1⅛	..	4 16 0
Do. 5 % Deb.	100	5	5	92 — 97	..	5 3 1
Madras Elec. Tr. (1904), Deb. ..	100	5	5	103 —105	..	4 15 3
Manaos Trams & Lt., 1st Deb. ..	100	5	5	90 — 93	+2	5 7 6
Manila Elec. R. and Ltg., Bonds	$1000	5	5	97 —100	.	5 0 0
Mexico Trams Com.	$100	7	7†	106 —108	.	6 9 8
Do. Gen. Con. 5 % Bonds ..	..	5	5	91 — 93	— ½	5 7 6
Do. 6 % Bonds	100	6	6	97 —99	— ½	6 1 3
Para Elec. Rlys. & Lt., Ord. ..	5	10	10	6⅞ — 7⅛	..	6 15 7
Do. 6 % Pref.	5	6	6	4¼ — 5⅛	..	5 11 7
Do. 5 % 1st Deb.	100	5	5	98 —100 xd	..	5 0 0
Perth (W.A.) Elec. Tr., Ord. ..	1	5	5½	1⅛ — 1¼	..	3 14 5
Do. 5 % 1st. Deb.	100	5	5	105 —108	..	4 12 7
Rangoon El. Tr. & Sup., Pref. ..	5	6	6	5⅜ — 5⅝	..	5 0 0
Do. 4½ % 1st Deb.	100	4½	4½	97 — 99	..	4 10 11
Rio de Janeiro Trams, 1st Mort. 5 % Bonds	..	5	5	101½—102⅜	— ⅛	4 17 4
Do. 5 % Mort. Bonds ..	100	5	5	95½— 96½	..	5 3 8
Sao Paulo Tram, Lt. and P. 5 % 1st Deb.	$500	5	5	101½—103½	..	4 16 7
Singapore Trams, 5 % Deb. ..	100	5	5	88½— 87½	..	5 14 3
Southern El. Tr. B.A., 5 % Deb.	100	5	5	96 — 98	..	5 2 0
Un. Elec. Trams Monte Video ..	5	7	6†	5 — 5⅜	..	6 10 3
Do. 6 % Pref.	5	6	6	4⅞ — 5⅛	..	5 14 3
Do. 5 % 1st Deb.	100	5	5	96½ — 98½	..	5 1 6
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	99 —102	..	4 8 3

MANUFACTURING COMPANIES.

Aron, Ord.	1	6	..	⅛ — ¼	..	8 0 0
Do. 6 % Pref.	1	6	6	3⅝ — 3⅞	..	7 2 2
Babcock & Wilcox	1	28	16	3 — 3⅛	..	5 2 6
Do. Pref.	1	6	6	1¼ — 1⅜ xd	..	4 7 3
British Aluminium, Ord. ..	1	Nil	..	1/16 — 1/8	..	..
Do. 6 % Cum. Pref.	1	Nil	6	¼ — ⅜	..	5 17 2
Do. 5 % Prior Lien Debs. ..	100	5	5	98 — 96	..	5 4 2
Do. Deb. Stk.	100	5	5	84 — 87	..	5 14 11
B.I. & Helsby Cables	5	10	10	7⅞ — 8	..	6 5 0
Do. Pref.	5	6	6	5⅞ — 6⅛	..	4 16 0
Do. Deb...	100	4½	4½	102 —104	..	4 6 7
British Thomson-Houston, Deb.	100	4½	4½	97 — 99	+1	4 11 0
British Westinghouse, Pref. ..	8	Nil	Nil	⅛ — ⅜	..	Nil
Do. Deb...	100	4	4	64 — 68	+1	5 17 8
Do. 6 % Prior Lien	100	6	6	98 —101	..	5 18 10
Browett, Lindley, Ord.	1	..	..	2/- —3/-	..	Nil
Do. Pref.	1	..	..	4/6 —5/-	..	Nil
Brush, 7 % Pref.	2	Nil	Nil	0 — ¼	..	Nil
Do. 5 % Prior Lien Deb. ..	100	5	5	73 — 78	..	6 8 2
Do. 4½ % Deb	100	4½	4½	38 — 43	..	10 9 4
Do. 4½ % Second Deb. ..	100	4½	4½	25 — 29	..	16 13 4
Callender's Cable	5	15	15	11 — 11⅜ xd	..	6 7 8
Do. Pref.	5	5	5	4⅞ — 5⅛	..	4 17 7
Do. Deb...	100	4½	4½	98 —101	..	4 9 1
Castner-Kellner	1	20	20	32⅜ — 32⅞ xd	..	5 0 0
Do. Deb...	100	4½	4½	103 —106	..	4 4 11

Crompton & Co.	8	Nil	..	⅛ — ⅜	..	Nil
Do. Deb...	100	5	5	55 — 57	..	9 15 6
Dick, Kerr	1	5	Nil	1/16 — 1/8	..	..
Do. Pref.	1	6	6	3⅛ — 3⅜	..	7 18 10
Edison & Swan, A, £8 paid ..	5	Nil	..	1/16 — 1/8	..	Nil
Do. fully paid	5	Nil	..	1¼ — 1⅜	..	Nil
Do. 4 % Deb.	100	4	4	60 — 64	..	6 5 0
Do. 5 % Second Deb. ..	100	5	5	70 — 73	..	6 17 0
Electric Construction	2	2½	2⅔	1⅝ — 1 5/16	..	5 14 4
Do. Pref.	2	7	7	1⅝ — 2	..	7 0 0
Greenwood & Batley, Pref. ..	10	7	7	7⅞ — 8	..	8 5 8
Do. Deb...	100	5	6	92 — 94	..	5 4 2
General Electric, 6% Pref. ..	10	5	6	10 — 10⅜	..	5 11 7
Do. Deb...	100	4	4	88 — 93	..	4 6 0
Henley's, Ord.	5	15	15	12½— 13	..	5 15 5
Do. Pref.	5	4½	4½	4⅞ — 5	..	4 10 0
Do. Deb...	100	4½	4½	101 —108	..	4 7 5
India-Rubber, G. & T.	10	..	7½	11 — 12	..	6 5 0
Do. Pref.	10	5	5	9 — 10	..	5 0 0
Telegraph Construction.. ..	12	17½	20	36 — 38	..	6 6 2
Do. Deb...	100	4	4	96 — 99	..	4 0 10
Willans & Robinson	1	Nil	..	1/16 — 3/16	..	Nil
Do. Pref.	5	Nil	..	⅜ — ⅝	..	Nil
Do. Deb...	100	4	4	57 — 59	..	6 15 7

Unless otherwise stated, all share are fully paid. † Interim dividend. ‡ Dividend of 4 per cent. guaranteed by Underground Electri Railways.

Bank rate of Discount 4½ per cent., April 17th, 1913.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING APRIL, 1913.

ALTHOUGH the April export figures fall very far short of the bumper total recorded in the previous month, the difference is to a large extent accounted for by the exceptional telegraphic export included during that month. The April exports amounted in value to £592,621 (as compared with £994,303 in March), while excluding telegraphic items, the total of £474,475 is some £10,000 less than recorded in March.

The month's exports included machinery to the value of over £210,000; cable, some £78,000 in value—showing a considerable decline; and over £70,000 worth of telephonic material—this also being much less than in March.

The imports, at £263,268, compared with £253,412 in March, showing an increase of nearly £10,000 in value, while the re-export totals were £23,349 and £23,723 respectively, for April and March.

Machinery imports were on a somewhat lower scale than in March, but increased values are recorded for cables, fittings and glow lamps.

An excellent all-round customer of this country was Argentina, while India, New South Wales and Canada also made comparatively heavy purchases. In the imports section, both the United States and Germany did an increased business with this country.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.

Destination of exports and country consigning imports.	Electrical goods and appliances.	Wires and cables, rubber and other insulations.	Electric lighting fittings and accessories.	Electric glow lamps.	Electric arc lamps and lamp parts.	Electric meters and instruments.	Electric machinery.	Electrically-driven machinery.	Batteries and accumulators.	Carbons.	Telephonic cable and apparatus and electric bells	Telegraphic cable and apparatus.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	1,646	426	67	196	655	152	6,992	100	24	...	19	493	10,770
Germany	3,364	4,358	35	110	469	...	6,186	415	22	31	52	1,742	16,784
Netherlands, Java and Dutch Indies ...	955	1,203	264	...	41	25	614	...	29	7	51	180	3,369
Belgium	1,783	296	151	149	374	29	3,852	341	87	207	1,402	298	8,969
France	977	13	3,934	47	12	48	794	30	...	145	187	57	6,244
Portugal	518	24	25	35	...	...	213	...	34	...	442	90	1,381
Spain and Canary Isles	1,579	1,351	74	...	...	719	5,534	...	1,553	...	1,505	966	13,281
Switzerland, Italy and Austria-Hungary ...	202	382	518	56	84	8	2,536	82	61	220	...	875	5,024
Greece, Roumania and Turkey	689	...	53	136	...	...	336	...	...	15	...	2,600	3,829
Channel Isles, Gibraltar, Malta and Cyprus...	720	368	14	...	...	33	184	...	...	...	15	348	1,682
U.S.A., Philippines and Cuba	200	...	49	40	...	55	2,840	...	...	13	...	500	3,697
Canada and Newfoundland	591	788	322	384	12	1,434	10,268	409	2,499	...	467	28,968	46,142
British West Indies and British Guiana ...	84	58	68	50	...	305	350	...	20	10	77	34	1,056
Mexico and Central America	13	...	...	10	29	...	90	...	...	...	87	262	491
Peru and Uruguay	743	22	145	171	68	74	1,160	56	46	...	60	171	2,716
Chile	584	1,556	470	187	170	2	4,543	2,175	77	29	152	4,416	14,361
Brazil	949	976	853	398	53	293	4,081	866	3,464	14	4,541	1,651	18,139
Argentina	4,360	14,150	1,624	1,346	229	554	21,656	5,204	1,432	166	10,969	7,333	69,023
Colombia, Venezuela and Bolivia	119	71	41	...	...	...	767	13	115	...	40	...	1,166
Egypt and Persia	502	1,071	108	196	13	198	943	296	2,351	...	835	4,505	11,018
British West Africa, Ascension & St. Helena	...	...	75	42	67	...	531	40	53	...	10	11,997	12,815
Rhodesia and Transvaal	2,291	2,529	494	2,174	...	9	11,587	32	1,709	21	79	126	21,051
Cape of Good Hope	1,629	3,868	231	341	31	1,251	4,793	269	314	74	242	1,884	14,927
Natal	1,227	5,414	376	12	63	132	7,610	93	513	...	91	132	15,663
Zanzibar, Brit. E. Africa, Mauritius & Aden	120	84	105	223	...	...	...	...	...	...	66	10,097	10,695
Azores, Madeira and Portuguese Africa ...	427	250	61	24	...	3	15,161	...	29	...	245	128	16,328
French African Colonies and Madagascar ...	5	...	...	...	190	...	15	35	...	...	...	15	260
China and Siam	707	5,108	319	1,097	113	2,210	4,791	103	35	174	...	620	15,277
Japan and Korea	685	20	1,097	...	...	991	12,444	2,672	237	21	3,836	4	22,007
India	6,012	15,771	3,246	3,069	198	2,251	18,985	3,667	4,691	187	1,301	2,312	61,690
Ceylon	118	173	246	39	...	...	2,222	306	132	...	141	147	3,524
Straits Settlements, Fed. Malay States and Sarawak	287	548	333	250	77	129	2,714	602	102	108	492	28,354	33,996
Hong Kong	511	31	303	671	...	163	359	60	875	...	11	255	3,239
West Australia	171	266	125	491	...	214	4,218	...	49	...	315	128	5,977
South Australia	1,000	1,382	100	427	...	894	617	...	28	28	3,949	98	8,523
Victoria	2,875	6,477	824	780	...	898	13,103	2	120	9	1,737	1,339	28,164
New South Wales	2,206	6,462	503	624	144	762	11,218	196	283	...	33,295	1,156	56,849
Queensland	244	54	229	123	...	94	3,355	...	...	...	232	62	4,393
Tasmania	...	99	...	100	...	39	70	...	13	...	...	...	321
New Zealand and Fiji Islands	1,353	2,322	750	396	...	572	3,331	1,024	302	54	3,873	3,803	17,780
Total, £	42,446	77,971	18,232	14,394	3,092	14,541	191,063	19,088	21,299	1,533	70,816	118,146	592,621

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

Norway, Sweden and Denmark	53	32	15	47	37	35	3,422	334	718	46	6,472	11,211
Germany	9,583	29,069	3,765	13,368	7,223	2,657	75,642	1,097	1,711	7,155	4,381	155,651
Holland	...	...	...	506	520	...	171	...	...	28	36	1,261
Belgium	1,156	2,737	171	183	86	...	3,407	28	282	18	5,650	13,718
France	432	650	1,306	760	245	921	1,004	156	1,282	3,532	2,093	12,381
Switzerland	95	554	43	4	...	731	998	75	...	133	...	2,633
Italy	264	5,569	...	...	...	...	8	...	...	...	1,422	7,263
Austria-Hungary	...	865	...	523	173	...	435	...	248	262	55	2,561
Spain	...	...	...	...	...	...	13	...	...	537	...	550
United States	8,986	114	1,522	36	204	165	10,694	29,635	...	94	3,376	54,826
New South Wales	...	95	...	...	83	...	...	...	890	...	...	1,068
Canada	135	...	...	...	...	...	10	...	...	...	...	145
Total, £	20,704	39,685	6,822	15,427	8,571	4,509	95,804	31,325	5,131	11,805	23,485	263,268

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

Various countries, mainly as above ...	10,040	806	...	2,617	590	...	8,018	...	172	757	349	23,349

TOTAL EXPORTS: £592,621. TOTAL RE-EXPORTS: £23,349. TOTAL IMPORTS: £263,268.

NOTE.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third columns contain many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns. Imports are credited to the country whence consigned, which is not necessarily the country of origin.

PROCEEDINGS OF INSTITUTIONS.

A New Form of Electrically-driven Two-high Continuous-running Reversing Mill.

By ANDREW LAMBERTON.

(*Abstract of paper read before the* IRON AND STEEL INSTITUTE, *May*, 1913.)

THE day has not yet arrived when it can be claimed that by the universal adoption of electricity as the motive power for driving rolling mills in iron and steel works, the highest economy in running costs can be attained. Speaking generally, where steelworks are associated with blast-furnaces, and perhaps also coking ovens, and an abundant supply of surplus gas is available for producing electric current at a low cost, electrical driving of such mills is clearly indicated. The greatest difficulty is met with in dealing with reversing mills of the two-high type, where the rolls have to be reversed at each pass, and when these mills are of large size the electrical plant is extremely costly, the reversing mill motors necessary being from 10,000 to 15,000 brake horse-power, due to their having to start from rest under full load at each reversal.

All engineers may be said to be in agreement that where rolling-mills can be driven by a constant-running motor associated with a heavy fly-wheel to take the peak loads of rolling, electrical driving is to be preferred, provided, of course, that the cost of current be low enough. For small mills rolling light sections and bars, which can be fed to the mills by hand, the three-high continuous-running mill is practically universally adopted, and in such cases the driving of these mills by a continuous-running electric motor leaves nothing to be desired. For larger mills rolling bars and sections of heavier type which cannot be fed by hand, and where live roller feeding-tables and mechanical manipulators are therefore necessary, the three-high type of mill is not so popular in this country.

It occurred to the author that if two-high section rolling-mills could be designed so as to be capable of being driven by a continuous-running electric motor, and at the same time give the necessary reversals to the bar at each pass, this would go a long way to meet the difficulties, as the ease of setting the rolls in the two-high mill, and the simplicity of the roller tables being fixed instead of moving, would be conserved, and the large and very costly reversing motor rendered unnecessary. The following is a short description of the method by which this is accomplished :—

The root idea of the new system is that, if in a mill with two rolls, arrangements can be made to make the bottom roll the top roll, and *vice versa*, then at each reversal of the position of these rolls there will be a pass in the opposite direction. If then a pair of rolls be mounted in circular gables, which are free to rotate in fixed frames or housings, this will afford a continuous-running two-high mill, which gives reversals at each pass, on the gables being rotated through an angle of 180°—half a revolution.

Referring to fig. 1, the two rolls A are mounted in the usual form of chocks B contained in the circular gables C, which gables are free to rotate in the fixed frames or housings D. In order to make the turning of the gables easy, these are carried on broad revolving anti-friction rollers E, fig. 2, placed immediately under the gables, and carrying the weight of the same. These anti-friction rollers have

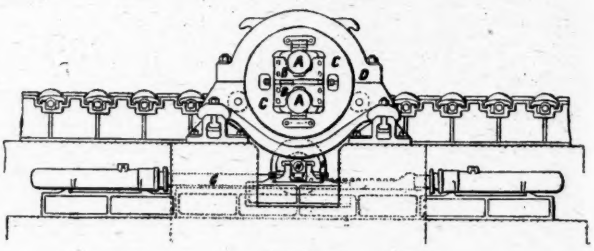

FIG. 1.

part of their breadth formed into a spur pinion F which gears with corresponding teeth in the rotating gables. By means of a hydraulically-operated rack G gearing into the pinion on the bottom roller shaft H, the rotation of the gables is quickly effected, the time taken being only three to five seconds, and the stroke of the hydraulic rams is just sufficient to bring the rolls to their exact position at each reversal. To provide for the alternate change in the position of the top and bottom roll, the driving spindles J, conveying the power from the mill pinions K to the rolls A, are disposed in the manner shown in fig. 2, and the weight of these spindles is borne by a balanced carrying gear, the weight of the descending spindle balancing that of the ascending spindle at each reversal. The mill pinions are placed side by side, and not superposed as is usual, as this side-by-side arrangement reduces the angle on the spindles during reversals.

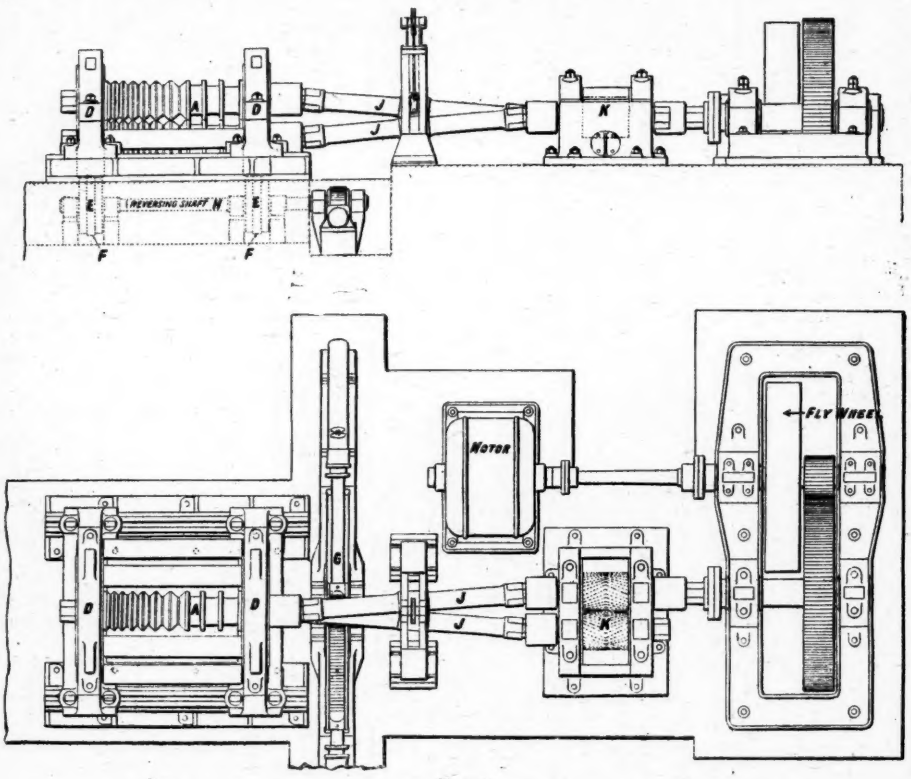

FIG. 2.

The motor, driving gear, and fly-wheel, require no description. By the employment of a high-speed continuous-running motor, the size and cost of such motor is reduced to a minimum; and, as the fly-wheel takes the peaks of the rolling loads, the highest economy in operation results.

A rail-rolling mill plant on this new system, capable of an out-put of 5,000 tons per week, comprises three distinct mills:—A cogging-mill taking the ingot and reducing it to a bloom; a roughing-mill to reduce this bloom to a roughly formed rail; and a finishing mill to finish the rail to the required section.

These mills are all of the same continuous-running reversing type. The live roller tables are all fixed tables of the simplest form, and the manipulation of the work is of the simplest character.

The first mill of this new type is now in course of construction, and will be put to work in a large steelworks in England in the early summer.

Power Supply on the Rand.

By A. E. HADLEY.

(*Discussion on paper read before the* INSTITUTION OF ELECTRICAL ENGINEERS, *at Manchester, March 11th*, 1913. *For abstract of paper* see ELECTRICAL REVIEW, March 28*th*.)

DR. E. ROSENBERG said that there were some remarkable features which distinguished the Rand power supply from all others. First the incredibly high load factor, with a peak load of 88,000 KW., and sales averaging 1,350,000 units per day. This meant that the load for the 24 hours was equal to 15·3 times the peak load. These figures would be the envy of most central station engineers.

MR. B. WELBOURN said that in certain parts of the world, including South Africa, a good deal of trouble had been experienced in cables due to white ants. He asked if the author had experienced this on the system described in the paper. In carrying a cable network over a country of this character, there was in all

probability considerable surface subsidence which might lead to trouble; had expansion joints been found necessary? With regard to the disk insulators used to build up the suspension type insulator, in view of the very frequent dust storms, he asked whether the distribution of pressure over these insulators had been affected by the accumulation of dust especially on the 80,000-volt line. With regard to line protection he had come to the conclusion that any form of arrester that involved a spark was distinctly a thing to avoid.

MR. G. D. SEATON said the efficiency reports commended themselves to him very much. A good deal of bad machinery was put into use in this country because it was cheap. Anything that brought out the merits of good machinery was to be encouraged, and the author was to be congratulated for his efforts in this direction. He would like to see such methods used by municipalities; if they were, he thought some astounding results would be seen.

MR. LAMB asked the author for an idea of the size of the cooling pond for the condensation water. The quantity of circulating water seemed to be low for the size of the plant.

MR. J. LUSTGARTEN asked if during the period of lightning, any insulators had been punctured. The question was an important one, because out of it arose whether an insulator existed to do this work. With regard to earthing the neutral, they had learnt that for all L.T. distribution circuits earthing the neutral was the best policy, but in Mr. Peck's recent paper the conclusions come to were that on H.T. circuits the neutral should not be earthed. The reason for that was that if working with an earthed neutral and flashing over took place on any of the lines, then if this flashing over persisted and the current was large enough, the circuit breakers would trip and interrupt the supply. Recent American practice had been to work with a non-earthed neutral and to use an arc suppressor.

MR. COATES asked if the switches in the sub-stations were of similar breaking capacity to those in the main stations.

MR. PARRY said it would be interesting to know how the cost of the 700 miles' scheme from Victoria Falls worked out in comparison with the present steam stations. Was there any reason why the power stations should not have been put down at the collieries and the power distributed from there?

MR. W. BOLTON SHAW asked what was the drop in pressure at the most distant point on the air supply system? The very small loss of 3 per cent. on the pipe line spoke well for the way in which the line had been installed.

MR. HADLEY, in reply, said they had not experienced any trouble on the cables through white ants. Owing to the very hard earth formation, subsidence was practically unknown on the reef, and therefore expansion joints were not used. There was no trouble in working overhead and underground cables together, but it had to be remembered that the 20,000-volt cables could only be connected to the 40,000-volt lines through coupling transformers. No trouble had been experienced with the suspension-type insulator due to dust. The Prat system of induced draught was one of the most interesting features of the installation; it also appealed on the question of saving freight, which was £10 per ton. Anything simplifying labour was also another great advantage. The system was so satisfactory that it had been applied on all the stations. The revision of price was entirely dependent on the cost of production and could take place every eight years. It was based on the average cost of the preceding three years. The size of the cooling pond depended on whether it was possible to discharge at one end and take in from the other. The amount of power used in the works at Rosherville depended on whether the pond was full, so that the natural gravity inlet was at the necessary height. On the whole, 4½ to 5 per cent. was a fair figure, and included the supply to the houses of the staff and the recreation rooms, &c. The water was measured by Lea recorders. As to the puncturing of insulators, it was so seldom that the line itself was struck by lightning that he did not think they had any records of any value on this point. With regard to earthed neutral, with the Merz-Price system, when the station cut off a faulty line, it did not interrupt the supply, as the latter was in duplicate; this was the great merit of the system, and it had been found extremely valuable. In regard to a question whether there were any other protective devices than the Merz-Price system, there were also maximum overload cut-outs provided, but they were screwed up so that they could not work. The general tendency was to make the machines hang on as long as possible, and only take them out of service if it was found really necessary. With regard to switches in sub-stations, there were two sizes of switches smaller than in the power station, *i.e.*, three sizes of switches on the system; since the neutral was earthed, there had been considerably less trouble on the system. The transformers in the consumers' sub-stations were oil transformers, air cooled, but the transformers in the power stations and in the main central stations were water cooled. The compressed-air supply was far larger than anything tried elsewhere. They had never had a failure of the supply, but occasionally the pressure had gone down. The maximum pressure drop between the compressors and consumer was 6 lb.

Mr. Hadley's paper was also discussed at the meeting of the SCOTTISH LOCAL SECTION OF THE INSTITUTION OF ELECTRICAL ENGINEERS on April 15th.

The CHAIRMAN was sorry that Mr. Hadley had not given more details about protection from lightning. Tropical storms were terrible, and while the earthed guard wires served as a great protection, at the same time those wires did not protect from static discharges. In a case which was brought under his notice, the only solution to periodical breakdowns in plant was a high resistance between the line and earth.

MR. BUNTON expressed interest in the load dispatcher system, and wished Mr. Hadley had described the particular system adopted on the Rand.

MR. SAM. MAVOR said that the generation and distribution of compressed air on so great a scale was a great piece of engineering. The most striking fact was the very small loss in transmission. The distance between the extreme mines supplied was about 14 miles, and the total run of pipe was 20 miles. The author said that the results of their tests showed that of the air units 95 per cent. had been recorded at consumers' meters and only 3 per cent. lost in transmission. The 3 per cent. loss in transmission must be taken as energy loss and not merely as pressure loss. He had had considerable experience of the use of the Venturi tube, and he had had many hundreds of careful observations made with it, and the results had all been satisfactorily consistent with each other, and he had not the slightest hesitation in saying that the measurements of accuracy claimed in the paper were well warranted. The efficiency of transmission was a testimonial to the type of joint, but he would like to ask how long it was anticipated that india-rubber rings would last? His experience had been that the low efficiency in the application of compressed air to mining was simply appalling. In the course of his investigations he had not found a single colliery where the loss in volume was less than 23 per cent. of the total volume of air compressed. When one compared that with the claims of the paper, the difference was enormous. Where the loss was 23 per cent. the pressure was only 30 lb.; with the higher pressure the loss would be very much greater. In some cases he found it as large as 40 per cent. Some of his tests had been made with up-to-date plant. In one of the largest Lancashire collieries, out of a total of 1,500 H.P., 400 to 500 represented leakage in volume alone. The paper was another illustration of the beneficent influence of the electrical engineer on any undertaking with which he associated himself. There had never been a satisfactory meter for metering compressed air, and, in view of the very considerable scale on which compressed air was used in this country for mining operations, it was not at all creditable to the compressed-air engineers that they had been all this time without a satisfactory meter. The electrical engineer had insisted on knowing what he was doing, and in the absence of a satisfactory meter he set about producing one. Compressed air was used for driving percussion drills. They were still in want of a satisfactory rock drill. The rock drill required a pressure of between 80 and 100 lb. Therein lay their present low efficiency, because the cylinder was filled with high-pressure compressed air at each stroke, and that was exhausted at very high pressure, and was thus thrown away in the exhaust. The power required for each drill was, approximately, 20 H.P., and the energy expended by the cutting of the bit was between 1 and 1½ H.P., so that the efficiency of the compressed air drill was only about 5 per cent.

MR. W. L. SPENCE referred to the statement in the paper that the chimneys were all of the cold compressed-air ejector type. These could not of themselves be of a high efficiency, but they were thoroughly adapted to the conditions, because of the high cost of construction in Africa. The figures with regard to air distribution were open to suspicion, but if the figures were correct the scheme justified itself.

MR. MACLEOD said that the system of induced fans could not be commended for general adoption, as it was open to objection that in certain circumstances the fans might fail the power house staff at a critical time. The confining of the pilot wires for operating the system with the telephone circuit in a lead-covered cable suspended overhead, seemed to him to be a tempting of Providence, because, in the event of a series transformer failing, it was more than likely that the telephone wire would be energised at any pressure up to 80,000 volts, and the operator who happened to be using the telephone at that time would have a very strenuous moment. Here they found there was endless trouble with suspended lead-covered cables through vibration causing cracking of the lead. In the Clyde Valley system they had used bare copper conductors for the protective gear, and also for the telephone system, and they had given uniform satisfaction.

MR. ROBERTSON (Clyde Valley Co.) pointed out that the cost of current was said to be ·525d., but there was no mention of the cost of coal delivered at the generating station. He would like to know the quality of the coal used. A 74 per cent. load factor was mentioned, and he took it that this was for both the electrical and compressed-air plant.

The CHAIRMAN admitted that it was very difficult to get an electric drill. With a solenoid the efficiency was very low, and they did not get the power they could get with an air compressor. There was a big field for anyone who could turn out a satisfactory electric drill to replace the air drills.

In the course of his reply, MR. STARR (who read the paper in the author's absence) said the system dealt with in the paper was similar to that used at Newcastle and by the Clyde Valley Co. In the latter they had at their Motherwell power house a diagram of connections and the regulations were that no switch was to be closed or opened without communicating with the switchboard at Motherwell. Mr. Mavor had referred to loss in transmission, the figures were 6 lb. out of 131 lb., and that was about 4½ per cent., the figure in the paper was 4 per cent. There was a certain number of units unaccounted for in every system. The jointing material for the pipe lines would not be pure rubber, it would be a compound of some sort. In reply to Mr. Spence, he did not see that the meter was so very complicated as compared with an ordinary electricity meter, and the latter recorded correctly. Induced draught had many disadvantages, and the comparison of natural with induced draught was a matter for controversy. Very often the local conditions

decided in favour of the one or the other. There was no good quality of coal on the Rand. The penalty for shutting down supply was 60 per cent. more than the price the consumer paid the company. That was, the consumer paid ·525 per unit, but for a shut down the company paid the consumer a sum equal to the units he should have got at a price of ·84 per unit. They had no stringent Board of Trade regulations on the Rand, and he took it that compressed air was used not only for the drills but for ventilation as well.

STANDARDISATION RULES FOR ELECTRICAL MACHINERY.

(Excluding Railway and Tramway Motors).

THE following code of rules was provisionally adopted on April 17th by the Council of the BRITISH ELECTRICAL AND ALLIED MANUFACTURERS' ASSOCIATION.

Other sections dealing with short-circuit tests, commutation, pressure regulation, parallel operation, efficiency, and tolerances, are at present under the consideration of the Standards Committee of the Association.

SECTION I.—STANDARD PRESSURES AND FREQUENCIES.

1. The standard frequencies for alternating-current work are :—50 cycles per second, and 25 cycles per second.

2. The standard high-pressure systems for alternating-current work are :—2,000, 3,000, 6,000, 10,000 and 20,000 volts.

3. The standard generator pressures are :—

For direct-current generators.	For alternating-current generators.
115 volts	440 volts
230 ,,	550 ,,
460 ,,	2,200 ,,
525 ,,	3,300 ,,
	6,600 ,,
	11,000 ,,

tandard low pressures measured at consumers' terminals :—

Direct-current.	Alternating-current.
110 volts	100 volts
220 ,,	200 ,,
440 ,,	400 ,,
500 ,,	500 ,,

(Motors are to be capable of operating without injury at their rated outputs and overloads on any pressures not exceeding 5 per cent. above or below their standard voltages. See Clause 6, Sec. IV.)

5. Transformers.—The normal rated pressure of the low-tension side of a transformer is to be the same as that of the consumer's supply, according to Clause 5.

It is recommended that the standard transformer ratios should be such as to transform between the standard pressures above-named.

SECTION II.—HIGH-PRESSURE TESTS AND INSULATION RESISTANCE.

(*a*) High pressure tests—(1) commercial high pressure tests are to be made on the completed apparatus while it is in good condition and before it is put into service. In the case of apparatus which has been in service reduced tests only are to be applied.

Unless otherwise specified, the high-pressure tests are to be made at the makers' works.

The test is to be made with a pressure of approximately sine wave form, preferably at the rated frequency of the apparatus, but in general any frequency between 25 and 100 is satisfactory.

Prolonged tests at high pressure are undesirable, since they permanently weaken the insulation.

2. The following tests are to be applied for one minute between the windings and the frame and core when the apparatus is at normal working temperature :—

Rated terminal pressure of circuit.	*Test pressure.*
Not more than 333 volts.	1,000 volts.
Above 333, but not more than 1,500 volts.	3 times rated pressure with a minimum of 1,500 volts.
Above 1,500, but not more than 2,250 volts.	4,500 volts.
Above 2,250 volts.	twice rated pressure.

Note.—In the case of machines driven by water-wheels and exposed to runaway conditions or otherwise exposed to possible excess pressure, it is recommended that pressure-limiting devices shall be provided, otherwise the test must be based on the highest pressure to which the windings may be subjected.

3. High-pressure tests on field windings are to be based on the excitation pressure. Field windings of synchronous machines intended to be started from the A.C. side are to be tested at a pressure of 5,000 volts unless the field windings are provided with a "break-up" switch, or will always be short-circuited at starting.

4. Transformers are to have the same test between high-pressure winding and core as between high-pressure winding and low-pressure winding. In making such tests the low-pressure winding should be connected to the core.

5. In general, constant current apparatus, and apparatus used for series operation, is to have the test pressure rating corresponding to the maximum pressure which may be impressed upon the apparatus.

(*b*) Insulation resistance.—(6) Very high insulation resistance (megohm test) should not be specified on electrical machinery, since in order to obtain it, long baking at high temperatures may be required, which may permanently damage the insulating material.

Insulation resistance tests are of value in showing the condition of the insulation, with special reference to moisture and dirt, and it is usually advisable to measure the insulation resistance before making high-pressure tests.

7. In general, an insulation resistance of 1 megohm for windings above 350 volts, or 0·25 megohm for low-pressure windings, is sufficient evidence that the windings are in condition to receive the high-pressure test.

SECTION III.—TYPES OF MACHINES.

The following classification of rotating machines is recognised : (1) open ; (2) protected ; (3) enclosed-ventilated ; (4) (*a*) pipe-ventilated, (*b*) pipe-ventilated, with "forced draught" ; (5) drip-proof ; (6) totally enclosed ; (7) flame-proof.

1. Requires no definition.

2. A "protected" machine is one in which the armature, field coils, and other live parts, are protected mechanically from accidental or careless contact, while free ventilation is not materially obstructed.

3. An "enclosed-ventilated" machine is one in which the ventilating openings in the frame are covered with

(*a*) Expanded metal or wire gauze of not less than $\frac{1}{4}$-in. mesh, so as not to obstruct free ventilation.

(*b*) Wire gauze, less than $\frac{1}{4}$-in., but not less than $\frac{3}{32}$-in. mesh, or with perforated metal having not less than $\frac{3}{16}$-in. holes.

(*c*) Machines having ventilating openings covered with screens having smaller openings than those specified in 3 (*b*) are to be treated as "totally-enclosed" machines as regards temperature rise and overloads.

4. A "pipe-ventilated" machine is one in which the frame is so arranged that the ventilating air may be conveyed to it through a pipe attached to the frame.

If the heated air expelled from the machine is to be conveyed away through a second pipe attached to the machine, this should be so stated.

It is understood that a pipe-ventilated machine propels its own ventilating air unless it is distinctly stated that the air supply is to be maintained by an independent fan external to the machine, in which case it becomes a "forced-draught" machine.

5. A "drip-proof" machine is one having a frame provided with ventilated openings, so protected as to exclude falling moisture or dirt.

6. A "totally-enclosed" machine is one in which the enclosing case does not allow a circulation of air between the inside and outside of the case, and is dust-proof, both as regards case and bearings.

7. A "flame-proof" machine is one in which the enclosing case can withstand, without injury, any explosion of gas that may occur within it, and will not transmit the explosion to any inflammable gas outside it.

An induction motor in which the slip rings and brushes alone are included within a flame-proof case should not be described as a "flame-proof" machine, but as a machine "with flame-proof slip-ring enclosure."

SECTION IV.—RATING.

1. Two classes of rating are recognised—continuous rating and short-time rating (for intermittent working).

2. The continuous rating is the output which a machine or a transformer will give for a period sufficiently long to attain practically constant temperature rise, and otherwise comply with these regulations.

Unless otherwise specified, any machine rated to operate between two limits of pressure shall have its ampere rating determined upon the higher pressure.

3. The short-time rating is the output which a machine or transformer will give for one hour, one half-hour, or other specified period, and comply with these regulations.

These ratings are called one-hour rating, one half-hour rating, or other specified rating respectively.

4. Machines with two or more fixed speeds are to have a definite rating for each speed.

5. Variable speed machines. These are of two classes :—

(*a*) Machines rated to give the same output throughout the entire range of operating speed. In such machines, the heating tests should be made at the lower limit of speed, and commutation tests at the upper limit of speed.

(*b*) Machines which are not rated to give the same output at all speeds. These machines should have ratings specified for both minimum and maximum speeds.

6. Test rating and pressure variation. Guarantees as to heating, efficiency and other characteristics are to be taken as applying to tests at the pressure marked on the nameplates, but motors must be capable of operating without injury at their rated outputs and overloads on any pressures not exceeding 5 per cent. above or below their standard pressures.

It should be noted, however, that the "pull out" torque or maximum torque available will vary approximately as the square of the terminal pressure.

SECTION V.—OVERLOADS.

1. (*a*) Machines with continuous rating having limits of full load temperature rise in accordance with Sec. VI. (*a*) are to be capable of withstanding 25 per cent. overload beyond the continuous rating for the following periods:—

100-KW. or H.P. and above	Two hours.
Below 100 KW. or H.P. not below 25 KW. or H.P.	One hour.
Below 25 KW. or H.P., not below 2 KW. or H.P.	One half-hour.
Below 2 KW. or H.P.	Five minutes.

(*b*) Machines with continuous rating having limits of full load temperature rise in accordance with Sec. VI (*b*) are to be capable of withstanding 15 per cent. overload beyond the continuous rating for the periods shown above.

(*c*) Machines with continuous rating, of the "totally-enclosed" class, having limits of full load temperature rise in accordance with Sec. VI (*c*) have no overload ratings except the momentary overloads required in connection with commutation tests.

The above overloads are to be measured in kilowatts, kilovolt-amperes, or horse-power according to the name-plate, except in the case of series or compound motors for which the overloads should be measured in amperes of input.

2. With machines having two or more fixed speeds the above overload ratings are to apply at each speed.

With variable speed machines having ratings at minimum and maximum speeds, the above overload ratings are to apply at each speed.

With machines having a speed range exceeding 2 to 1 and the same ratings at all speeds, the above overload ratings apply at any speed from the minimum to 75 per cent. of the maximum speed.

3. Motors with short-time rating are to be capable of carrying an overload of 100 per cent. torque for 30 seconds.

4. Transformers are to be capable of withstanding overloads of 25 per cent. for two hours, and 100 per cent. for 30 seconds.

SECTION VI.—HEATING.

1. Determination of temperature rise.—The temperature rise of electrical machinery, both rotating and static, is to be taken as the difference between the cooling air temperature as defined in Clause 6 and the temperature of the machines after giving their normal rated output for the following periods:

(*a*) For machines with continuous rating. Until the temperature rise is practically constant; that is, until the rate of increase of temperature rise does not exceed 1° C. per hour.

(This condition will usually be reached in less than six hours, except in the case of oil immersed transformers.)

(*b*) For machines with short-time rating.—After working continuously for the period defined by the rating.

2. Permissible temperature rise.—For machines with continuous or with short-time rating and designed to operate under ordinary conditions of cooling, *i.e.*, designed for an air temperature of 25° C. (77° F.), the following temperature rises are the highest permissible at the normal full load:—

(*a*) MACHINES HAVING UNOBSTRUCTED VENTILATION.

(*Section III, Classes* 1, 2, 3*a*, 4*a*, 4*b*.)

	Rise by thermometer.
All windings	40° C. (72° F.)
Cores in which windings are embedded ...	40° C. (72° F.)
Commutators and slip rings	55° C. (99° F.)

In general the temperature rise by increase of resistance should not exceed 55° C. (99° F.) for alternator field coils, or 60° C. (108° F.) for shunt field coils of direct-current machines in this class.

(*b*) MACHINES HAVING PARTIALLY OBSTRUCTED VENTILATION.

(*Section III, Classes* 3*b*, 4*a*, 5.)

	Rise by thermometer.
All windings	47° C. (85° F.)
Cores in which windings are embedded ...	47° C. (85° F.)
Commutators and slip rings	55° C. (99° F.)

In general the temperature rise by increase of resistance should not exceed 65° C. (117° F.) for shunt field coils of direct-current machines in this class.

(*c*) MACHINES OF THE "TOTALLY-ENCLOSED" CLASS.

(*Section III, Classes* 3*c*, 6 *and* 7.)

	Rise by thermometer.
All windings	55° C. (99° F.)
Cores in which windings are embedded ...	55° C. (99° F.)
Commutators and slip-rings	55° C. (99° F.)

In general the temperature rise by increase of resistance should not exceed 70° C. (126° F.) for shunt field coils of direct-current machines in this class.

3. Transformers.—The temperature rise of transformers is to be measured at their rated full-load output, under the conditions specified in Clause 1. It is permissible, however, to reduce the time of test by running for a time on an overload in current and pressure, then reducing the pressure to normal, and maintaining at this until the required standard rate of temperature rise is attained.

The limit of permissible temperature rise at the rated full load is as follows:—Oil-cooled, by resistance or by thermometer in the oil, 50° C.; air-cooled, by resistance or by thermometer, 50° C.

4. Machines for Tropical Conditions.—For tropical conditions or other cases where the cooling air temperature is in excess of 35° C., the permissible temperature rises shown in the preceding clauses are to be reduced by 20 per cent.

This does not apply to machines insulated with special heat-resisting materials in accordance with Clause 5.

5. Special Heat-Resisting Materials.—The limits of temperature rise shown in Clauses 2, 3 and 4 above, apply to windings whose insulation consists wholly, or in important part, of cotton, paper, varnished cloth or similar materials.

Higher temperature rises are permissible in the case of windings where asbestos, mica or preparations of these materials are solely relied upon for insulation.

6. Measurement of Cooling Air Temperature.—The air temperature is to be taken as the mean of the temperatures measured at regular intervals during the last quarter of the test period.

When the machine under test is provided with pipe ventilation or forced draught, the air temperature is to be measured by a thermometer placed in the current of incoming air.

In the case of machines other than those referred to in the preceding paragraph, the air temperature is to be taken as the mean of the readings of two or more thermometers placed not more than 6 ft. from the machine, and on a level with its centre on opposite sides. So far as possible, these thermometers should be placed so as to measure the current of air flowing towards the machine, but they must not be exposed to radiation or stray draughts.

7. Correction for Altitude.—When a machine is intended for service at high altitude, the permissible temperature rise, if tested near sea-level, is to be reduced 2½ per cent. for each 1,000 ft.

UNIVERSITY OF HONG KONG.

ADDITIONAL EQUIPMENT.

WE have received a second list of experimental apparatus and machines presented to the newly-established University of Hong Kong. We are glad to notice that upwards of 80 firms have promised assistance, and there is no doubt that there will be, in the greatest distributing centre of China, a permanent exhibit of British engineering appliances. At the same time we regret to notice that electrical firms have not responded to the appeal from this British Colony as well as we should wish. A number of electrical firms have shown practical sympathy, and we sincerely trust that makers of electrical machinery will also send help. The Asiatic Petroleum Co., Ltd., have offered to supply the necessary oil fuel for the engines and boilers, which will be oil-fired. We gave a list of many of the gifts in our issue of January 31st, page 194. The shipping companies have offered to send *freight free* all the presentations to the University, and intending donors should communicate with Messrs. Matheson & Co., 3, Lombard Street, London, who have kindly taken charge of these arrangements.

We may mention that Prof. C. A. M. Smith will be in London in June, and letters addressed to him at the Royal Colonial Institute, Northumberland Avenue, W.C., will receive immediate attention. Among the electrical apparatus urgently needed we notice the following:—

One 5-KW. D.C. generator, 110 volts, shunt regulation, speed about 750 R.P.M.

One motor converter, speed about 1,450 R.P.M., and consisting of:—(*a*) One 20-B.H.P. single-phase induction motor, 110 volts, 75 cycles, with starter; (*b*) one 15-KW. D.C. generator, 110 volts, shunt regulation.

One booster, with potentiometer rheostat on fields, current capacity 50 amperes, voltage range 0-50, with 4-H.P. 110-volt D.C. driving motor.

A 16-panel switchboard for 110 volts.

Telegraphic apparatus.

Telephonic apparatus.

A balancer set consisting of two 7-KW. D.C. generators upon the same bedplate, each generating 110 volts and running at 1,500 R.P.M.

A single-phase four-pole alternator of 10-KW. capacity, frequency 50, and running at 1,500 R.P.M. on the same bedplate as (1). Voltage 110 D.C.

A booster, capacity 100 amperes, and giving any voltage 0-50, with potentiometer regulator and series resistance. Speed about 1,500 R.P.M.

A rotary converter, 7-KW. capacity. D.C. side 220 volts. A.C. side provided with two-phase and three-phase slip rings. Four-pole, speed 1,500 R.P.M. Frequency 50 with field rheostat. To be arranged for separate driving when required.

A 10-KW. three-phaser with separate windings giving 110 volts per phase, capacity speed 1,500 R.P.M., frequency 50, four poles, with field rheostat.

A 12-KW. D.C. motor wound for 110 volts, running at 1,500 R.P.M., mounted on the same bedplate as (5) with starter.

A 220-volt 10-KW. D.C. generator complete with static balancer and field rheostat.

A 15-H.P. D.C. motor 110-volt on the same bedplate as (9), and running at the same speed with starter.

A three-phase induction motor, frequency 50, speed 1,500 R.P.M., 10 H.P., with wound rotor and starting resistance and short circuiting gear.

A 7-KW. 110-volt D.C. generator running at 1,500 R.P.H. and mounted on the same bedplate as (11) with field rheostat and starter for use as motor.

A 3-H.P. two-phase induction motor, 150 volts, frequency 50, squirrel-cage rotor.

Switchboard, 21 panels + 3 spare.

THE ELECTRICAL INDUSTRY IN FRANCE.

By GEORGES DARY.

(*Continued from page* 797.)

For some time past Paris, too confined by the surrounding fortifications, has been spreading out in all directions; new houses, streets and avenues having come into existence as far as Versailles to the west; to Champigny on the east; and to Saint Denis and Enghien on the north—a radius of over 12½ miles from the walls of the city. The result of this crowding of inhabitants, and the want of space in the centre of Paris, is that, just as in London, business men, employés and commercials have begun to make for the suburbs in order to secure more space, larger houses, the long-desired gardens, and, above all, to secure a reduction in rent, which, in Paris, has become far beyond the means of ordinary purses. This daily emigration from the city of quite an army of persons cannot be carried out except by a frequent and rapid means of transportation. This is the reason that has rendered necessary within the last five or six years the doubling of the means of transport, which are already insufficient to meet the needs of the steadily increasing number of passengers. Within Paris itself the Metropolitan underground electric railways have proved a solution to a part of the question, but as to the traffic outside Paris, the increase of the number of trains on the suburban lines to the practical maximum has proved insufficient.

The only available means of dealing with the problem was that of the electrification of all the lines running out of Paris in all directions and up to a pre-determined distance. In this way a minimum of congestion in the departure stations in Paris and a maximum of speed and frequency can be obtained. The chief companies have decided on this course, and the programme of the electrification of the Paris suburban railways will be carried out from year to year until the scheme has been completely realised. In 1908 we drew attention to the electric railway between Paris-Invalides and Versailles, and to that from Paris-Quai d'Orsay to Juvisy. The first-named line forms part of the State's Western system, while the second belongs to the Orleans Railway Co. On the present occasion we must mention the very important scheme for the electrification of all the suburban lines running out of the Gare St. Lazare, Paris, and which also form part of the State's Western system.

The St. Lazare station is peculiarly situated; the 27 lines running into it have, owing to the Batignolles tunnel, after reaching Paris, to be reduced to eight tracks, there being absolutely no land available for expansion. On these eight tracks no less than 1,200 trains per day have to be run in both directions without counting the shunting of about 200 locomotives. We believe that the conditions are unique, and find no parallel in any part of the world. As a result of this "bottle-necking," quite a number of complications have to be dealt with—unexpected stops, delays, blockages, ... and accidents, which are steadily increasing in number. It was, therefore, necessary to alter the whole conditions, and it was consequently resolved:—(1) To demolish the Batignolles tunnel and the numerous houses built above it and to replace it by an open cutting covered by steel bridge work to give communication between the two sides. In this way it will be possible to increase the number of tracks by two; (2) to construct an underground railway with five tracks, and a second arrival station provided with platforms 490 ft. long, reserved for the suburban lines, which are to be electrified.

The electrification scheme which received the official sanction on May 9th, 1912, will consequently comprise the following lines:—

Paris (St. Lazare) to Auteuil and Champ de Mars, 13⅛ miles, double track.

Paris (St. Lazare) to Versailles (right bank) and to St. Nom la Bretèche, 21⅞ miles, double track.

Paris (St. Lazare) to Saint Germain-en-Laye, 15 miles, double track.

Paris (St. Lazare) to Mantes and Pontoise, *via* Maisons-Laffitte and Argenteuil, 37½ miles, double track.

With the exception of the Versailles and Argenteuil lines the departure platforms of which will be in the upper station, the others will, on entering Paris, be underground lines as far as St. Lazare.

The work is being carried out in three sections, commencing with the lines that are the most blocked—those to Auteuil and Versailles. It is hoped that the first section will be completed in 1914 or by the commencement of 1915. The total cost of the work is estimated at no less than £5,560,000. In the original project, the supply of the current necessary for the working of these lines was to have been carried out by the State, which owns the system. A generating station was to have been erected on land purchased for the purpose at Bezons Bridge, and the electricity station at Moulineaux was to have been extended so as to have an output of 25,000 KW. Eventually it was decided to procure the necessary electrical energy from private companies in place of establishing a Government plant, and tenders were invited for the contract, conditions coupled therewith being that the contractor should take over the Moulineaux generating station—which supplies the current to the Paris (Invalides)-Versailles line—and the land acquired by the State at Bezons Bridge. Provision was also made for supplying energy by transmission lines from generating stations outside Paris (the Rhone transmission line or that from the Nord). In the latter case, the steam-driven stations established in Paris for the supply of current to the railway system, must be kept with steam up in readiness for use at any time in case of breakdown of the main supply. The power available at the Moulineaux station will be 25,000 KW., and at the Bezons Bridge plant 40,000 KW. The contract is for a term of 30 years, and the contracting company will be required to deposit a sum of £60,000 by way of guarantee.

The trains will be supplied with continuous current at from 600 to 650 volts, and by means of a third rail lateral to the track. The electrical energy, generated at the power stations in the form of three-phase current at a pressure of 15,000 volts, will be transmitted by underground cables to transformer sub-stations erected along the lines.

The trains will comprise new four-axle double-bogie motor carriages, the trials of which have just been carried out on the Invalides-Versailles line. The vehicles, which have a length of 73½ ft., comprise a luggage compartment and two first and second-class compartments. Their large dimensions will enable a single vehicle to form a train during the quiet hours of the day. The underframe is provided with two 250-H.P. motors, by means of which a speed of 50 miles per hour can be attained on the level and 31¼ miles per hour on slight gradients. The control is arranged on the multiple-unit system, with controllers at both front and rear of the vehicles. The carriages are lighted and heated electrically, and have seats for 64 persons and standing room for 36 others, or a total of 100 passengers per vehicle. The ordinary buffer connection between the carriages is replaced by an automatic central-coupling attachment. All these characteristics will enable lighter and less lengthy trains than at present to be built up at the busy hours, and will form a true solution of the crowding at the large stations in Paris which are invaded in the mornings and evenings, at midday and at 1 o'clock—that is, four times each day—by suburban passengers and traffic.

Before leaving Paris and its suburbs, we should mention the complete electrification of the tramway system of the Compagnie Générale des Omnibus, an extensive project, part of which has already been carried out, while the remainder will be pushed through as rapidly as possible until the whole scheme is complete. The Compagnie Générale des Omnibus commenced its operations on March 1st, 1855, with 435 horse-drawn 'buses, which served 25 routes of a total length of 93 miles in Paris, and 28 routes, extending to 122 miles,

in the suburbs. After having constructed several lines of tramway on its own account, it was only in 1903 that the Compagnie des Omnibus took over the municipal tramway system, the concession for which up till then was held by the Paris Municipality. This system to-day comprises 39 routes, having a total length of 183 miles. Up to 1900, it may be said that the methods of tramway traction in Paris included every known system, and formed what may be termed a living museum of all the different types of motors that had been-invented, possible and imaginary—compressed-air motors, hot-air motors, steam engines, in fact, motors of all kinds; Serpollet steam generators, Purrey steam boilers . . . . electric motors with accumulators, with overhead conductors, with surface contact collectors and underground conduits—and all of these working on the different lines! To-day it is proposed to suppress these different systems and to work the whole tramway system electrically on the overhead principle in the outskirts and on the conduit system in the interior of Paris.

The necessary electrical energy will be supplied from three generating stations, situated respectively at Saint Denis, Vitry-sur-Seine and at Billancourt. The three-phase current generated at a pressure of 12,000 volts at these stations, will be distributed by high-tension feeders to eight sub-stations, where it will be transformed to continuous current at 600 volts, and, as such, transmitted to the lines. The sub-stations will be connected one with the other in such a way that, in case of a stoppage at any one of the central stations, they may be fed from the two others. The feeder system will consist of three-core armoured lead-covered cables; the hoop-iron armour is separated from the lead casing of the cables by two sheets of coated paper, a band of cotton and two layers of tarred rope in order to protect the cables from any chemical phenomena which may be experienced in the earth. For the 300, 400 and 600 sq. mm. conductors, aluminium has been substituted for copper.

The underground conduit, which will be adopted for the central part of the system, and which will extend to an additional distance of about 37½ miles, has been constructed by the Compagnie Thomson-Houston, and is of the central type already installed on two lines in Paris (three other lines, Etoile-Bastille, Chatelet and Reaumur, are of the lateral conduit type). It is built up of cast-iron chairs weighing 352 lb. each, and set at distances apart of about 4 ft. 3 in.; the extremities of the chairs support the running rails, while the slotted rail is fixed to the centre. The lines worked on the overhead-conductor system extend to a distance of about 144 miles. As regards the rolling stock, the company has decided to suppress the usual double-deck vehicles, on account of their causing delays owing to passengers having to mount

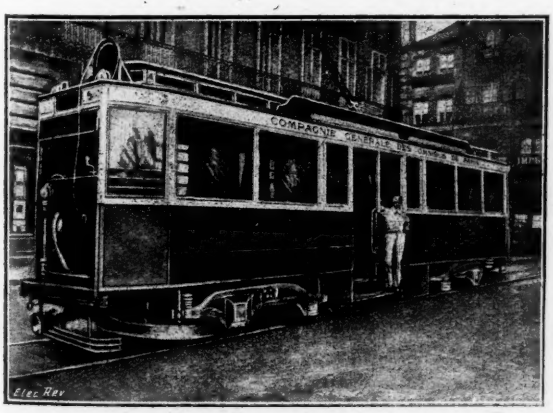

Fig. 2.

up to, and descend from, the top. With the view, however, of meeting all requirements, and in order that the cars, notwithstanding their great length, may easily pass round sharp curves, possess perfect underframe rigidity, and sufficient adhesion, the company has been led to adopt three types of car, according to the lines on which they are to be used:—(1) A car with bogies, one axle of which is provided with a motor for driving purposes, while the other axle, which is fitted with smaller diameter wheels, is intended for steering (fig. 2). The point of support of the car body on the frame has been arranged as close as possible to the driving axle in order to increase the load on the latter. These cars are intended for use on the routes on which there is a heavy traffic combined with only moderate gradients. (2) For routes comprising steep hills, and on which cars with trailers are employed, a motor tramcar with two axles and a large wheel base—11 ft. 9 in.—has been adopted; to facilitate running round curves a certain amount of play is left in the axle boxes to permit of convergence in the axles, this arrangement having been adopted with success in connection with the tramways in Vienna. (3) Finally, for the routes on which there is only a relatively light traffic, a smaller type of car with end platforms, and with a wheel base of 10 ft. 8 in., has been adopted.

The electrical equipment will comprise two motors per car, of from 50 to 60 H.P., and of the auxiliary or commutator pole type. The addition of the auxiliary poles has enabled the problem of commutation to be solved. The controllers are of the series-paralled type with magnetic blow-outs and are sectionised, so that in case of accident it is possible to cut out a part of the equipment, and to run at a slower speed with the remaining portion. A small combined motor and compressor produces the compressed air necessary for the working of the automatic brake; it comprises an electric motor of from 3 to 4 H.P., working continuously, but able to develop double that power when used intermittently, a compressor and an electric pressure regulator.

According to a report presented to the Société des Ingenieurs Civils de France by M. Mariage, manager of the Compagnie des Omnibus, the estimates for the acquisition of 1,100 tramcars amount to £960,000. As for other costs in connection with the scheme, they comprise £100,000 for high-tension feeders, £156,000 for sub-stations, and £192,000 for continuous-current feeders.

In addition, the cost of organising and equipping 13 depôts for the storage of the cars and a central repairing establishment—jointly used for the motor-'buses and tramways of the company—is estimated at £140,000.

To summarise or even enumerate the new electricity-distributing installations that have been established in provincial France during the last five or six years is practically impossible, and even if attempted, would consist mainly of a wearyingly long list of names of towns. Therefore, before passing to the Pyrenees, where at present several interesting installations are being carried out, we will content ourselves by drawing attention to the activity which prevails in all parts of France and the object of which, as we pointed out at the commencement of this article, is to provide the different districts with a supply of electrical energy, either by utilising available water-power or by establishing generating stations directly connected with collieries with the view of securing low costs of production.

To give an example, we may draw particular attention to the plant of the Compagnie Electrique du Nord, which is destined to become the main artery of a large system supplying current for lighting and power purposes to the majority of the industrial centres in the Nord and Pas de Calais Departments, if not later on to the suburbs of Paris, as we have previously indicated. Already the supply mains of the company extend to a distance of over 37 miles, supplying the current required for haulage purposes by the Société de Halage Electrique, which works the canals in the district of Douai.

The generating station, which is situated at Pont-a-Vendin, belongs to the Société des Mines de Lens; it produces 50-period three-phase current, at 45,000 volts pressure. The high-tension mains—three in number—convey the current to five sub-stations, located at Bauvin, La Batterie, Douai, Arleux and Hem-Leuglet. Special care has been devoted to the arrangements for the protection of the overhead lines where they cross roads and railways.

The details of the installation need not now be gone into; we have only referred to it because of the future extensions, which will reach to all parts of the Nord Department, and

because of the important character it will assume in the near future. Similarly, we will only mention, in choosing at random from a long list of similar undertakings, the names of the Société de l'Energie Electrique du Centre, La Compagnie Electrique du Jura, La Compagnie Générale Electrique de la Marne, La Compagnie Lorraine d'Electricité, La Société Hydro-Electrique des Basses Pyrenées, La Société de l'Energie Electrique du Sud-Ouest, La Société des Forces Motrices du Refrain (Doubs), and La Société Force et Lumière du Val d'Arly. This short list will be sufficient to prove the truth of our assertions at the beginning of this article, and for us to state that the number of electricity supply companies established in France has more than doubled since 1908.

We may now devote attention to the new installations which have been established, and also to those in course of construction in the Pyrenées, which will complete our endeavours to demonstrate to the readers of the REVIEW, the present prosperous condition of the electrical industry in France and the immense progress which the industry has made within the short space of five years.

To begin with the work which has been commenced by the Midi Railway Co. in connection with the adoption of

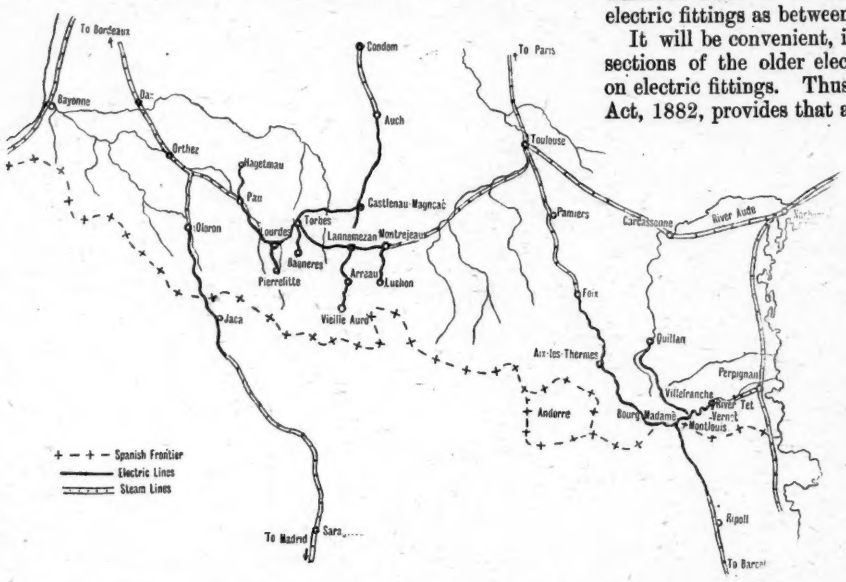

FIG. 3.—MAP OF ELECTRIC RAILWAYS IN THE PYRENEES.

electric traction, it may be stated that this company has decided to electrify practically all the lines comprised in its Pyrenées and trans-Pyrenées system, these being as shown in the accompanying map (fig. 3) :—

1. The Villefranche de Conflent-Bourg-Madame (Spanish frontier) line, a distance of 35½ miles, with branches from Villefranche to Vernet, and from Bourg-Madame to La Tour de Carol.

2. The Foix-Ax-les-Thermes line (25½ miles) and its extension from Ax-les-Thermes to Ripoll (Spain) *via* Bourg-Madame, 25¼ miles. This line places Toulouse in direct communication with Barcelona.

3. The Montrejeau-Pau section, 70 miles, with branches from Montrejeau to Luchon (22 miles), and from Lannemezan to Arreau (15½ miles), from Tarbes to Bagnères de Bigorre (13¾ miles), from Lourdes to Pierrefitte (12¾ miles), and from Pau to Oloron and Laruns (33¾ miles).

4. The Auch-Lannemezan line (43½ miles), with a branch from Castelnau-Magnoac to Tarbes (25 miles of 39-in. narrow-gauge line).

5. The Arrean-Vielle-Aure (French frontier) line (7 miles).

6. The Pau-Hagetmau line (32¾ miles).

7. The line from Oloron to the Spanish frontier (32½ miles), giving direct connection between the Southern line and Saragosa, Spain, and

8. The line from Quillan to Montlouis and Belesta.

The majority of these lines comprise gradients which are too steep for steam traction ; the others have to bear a very heavy traffic, which is more easily dealt with electrically, and it is for these reasons that the Midi Railway Co. has decided to adopt electric traction on practically the whole of its system in the Pyrenées.

(*To be continued.*)

ELECTRICAL FITTINGS AND THE LAW.

[FROM A LEGAL CONTRIBUTOR.]

To judge from the legal queries addressed from time to time to the ELECTRICAL REVIEW, it would seem that the supply, hire, and use of electrical fittings, are matters which frequently give rise to questions of legal difficulty. It is probable that few householders in a town have a very clear notion as to how their premises came to be wired for electricity. Again, the consumer's mind is frequently in a nebulous state as to what his rights are in relation to electric fittings as between himself and his landlord.

It will be convenient, in the first place, to consider some sections of the older electric lighting Acts in their bearing on electric fittings. Thus, Sec. 24 of the Electric Lighting Act, 1882, provides that any officer appointed by the undertakers may at all reasonable times enter any premises to which electricity is, or has been, supplied by the undertakers, in order to inspect the electric lines, meters, accumulators, fittings, works, and apparatus, for the supply of electricity belonging to the undertakers, and for the purpose of ascertaining the quantity of electricity consumed or supplied, or where the undertakers are authorised to take away and cut off the supply of electricity from any premises, for the purpose of removing any electric lines, accumulators, fittings, works, or apparatus belonging to the undertakers, repairing all damage caused by such entry, inspection or removal. The powers conferred by this section must not, however, be arbitrarily exercised. Due notice of an intended visit should be given, for it was decided in Brompton, &c., Electric Supply Co. *v.* Shadforth (ELECTRICAL REVIEW, July 24th, 1903) that where a consumer refused to allow inspectors to come into her house unless she received previous notice of their visit, an injunction ought not to be granted to restrain her.

Electric fittings are also protected from distress from rent. Thus, by Sec. 25 of the Electric Lighting Act, 1882, where any electric lines, meters, accumulators, fittings or works or apparatus, belonging to the undertakers—*i.e.*, the local authority or company supplying electricity—are placed upon any premises for the purpose of supplying electricity, they shall not be subject to distress, or to the landlord's remedy for rent of the premises where the same may be, nor be taken in execution under any process of a court of law, In the ordinary way, they might be seized by the landlord whose rent was in arrear. This affords considerable protection to the undertakers. Very often, when a tenant does flit, the only articles of *vertu* left on the premises are the electrical fittings, which the landlord would be glad to sell in order to satisfy some part of his claim for rent outstanding.

But what are "fittings" within the meaning of the section? Wires and pipes through which wires are laid naturally come under this heading, but there are other things not so easy to classify. It was decided under Sec. 14 of the Gas Works Clauses Act, 1871, which is similar to the above, that a gas stove let for hire is a "fitting for the gas" within the meaning of that section, and is, therefore, not subject to distress for rent (see Gas Light and Coke Co.

v. Hardy, 1886, 17 Q.B.D. 619). It would seem to follow from this that electric stoves, kettles, fans and electric irons, if hired out by the local authority to the consumer, would not be subject to distress by the landlord.

As to whether electric fittings let on hire by the supply authority vest in the trustee in bankruptcy of the consumer, it is difficult to speak with certainty. The law of bankruptcy provides that goods which are in the order and disposition of the bankrupt, with the consent of the true owner, at the date of his bankruptcy, shall vest in the trustee for the benefit of creditors. And this is right; for credit is naturally given to a man upon the strength of the goods which he has upon the premises. But where it is well known that certain classes of goods are customarily lent on hire, the presumption that they belong to the bankrupt does not arise. For instance, the custom of hotel keepers to hire furniture is so well known that such furniture does not vest in the trustee in bankruptcy of the hotel proprietor.

Questions arise from time to time as to the power of local authorities supplying electricity to deal in fittings. It is common to find in the Acts of local authorities a special clause to enable them to sell, let, hire, but not to manufacture, lamps, meters, electric fittings, &c. The terms of these clauses vary somewhat. In the Nottingham Corporation Act, 1889, Sec. 4, the power conferred is to provide and let, &c., but not to manufacture, "lamps, meters, electric lines, fittings, apparatus, and things, for lighting and motor power, and for all other purposes for which electric energy can or may be used, or otherwise necessary or proper for the supply, distribution, consumption or use of electrical energy." The Manchester Corporation (General Powers) Act, 1898, after the usual wide powers, contains these words: "Electrical motors, and apparatus for the use of electricity for motive power and other purposes."

The Halifax Corporation Act, 1898, is even wider in its terms. It authorises the Corporation to "purchase, hire, sell, let on hire, or otherwise deal with dynamos, electric motors, accumulators, meters, burners, arc and other lamps, fittings, wires, plant, engines, conductors, machinery, apparatus and appliances for and in relation to the production, supply, distribution or utilisation of electricity, or required or used for or in connection with their electrical works and undertaking."

The new Electric Lighting Act of 1909 gives a further protection to electric fittings. It is there provided by Sec. 16 that "all electric lines, fittings, apparatus and appliances let by any undertakers on hire or belonging to any undertakers, but being in or upon the premises of which the undertakers are not in possession shall, whether they be or be not fixed or fastened to any part of any premises in or upon which they may be situate, or to the soil under any such premises, at all times continue to be the property of, and removable by, the undertakers, and Secs. 24 and 25 of the Act of 1882 shall extend and apply to all such electric lines, fittings, apparatus and appliances: Provided that such electric lines, fittings, apparatus or appliances have upon them respectively a distinguishing metal plate affixed to a conspicuous part thereof, or a distinguishing brand or other mark conspicuously impressed or made thereon, sufficiently indicating the undertakers as the actual owners thereof. For the purposes of this section, electric fittings, &c., disposed of on the terms of payment by instalments are deemed to be electric fittings, &c., let on hire by the undertakers. This section does not affect the amount of the assessment for rating of any premises upon which any electric lines, fittings, apparatus or appliances are or shall be fixed."

Electric lines, fittings or other apparatus may be so affixed to a house as to become part of the land for "*quicquid plantatur solo, solo cedit.*" In that case they would pass by a conveyance of the law, or become the subject to an existing mortgage, although they were merely hired by the owner or lessee of the land under a hiring agreement, or agreed to be purchased under a hire-purchase agreement and not yet paid for. (Holland *v.* Hodgson (1872) L.R. 7 C.P. 328.) The owners of lines, fittings or apparatus has, however, by virtue of the hiring or hire-purchase agreement, if in the latter case they are to remain his property till paid for, an equitable interest in the land under which he may remove his lines, fittings or apparatus (*re* Samuel Allen and Sons, Ltd. (1907) 1 Ch. 575).

It has, of course, been decided that the Electric Lighting Acts do not authorise undertakers to supply electric fittings and apparatus other than meters.

CONSULAR NOTES.

South Africa.—The Austrian Consul at Cape Town reports that British cables, which are recommended by engineers in South Africa, have recently strengthened their hold on the market. German cables, which are favoured by German importers, have shown a tendency to fall off, and Italian cables have for the first time appeared in the market. The future will show whether this is just a temporary appearance due to one delivery, or whether Italy will continue to prove a factor in the competition. The Cape Province is, however, rather unimportant as a market for cables, when considered relatively with the Transvaal. In order to secure trade in this line, it is almost essential that firms should be represented.

Japan.—The American Consul at Yokohama reports that the sale of American electrical machinery and supplies to Japan during 1912 was the largest in the history of this line of business in that country. The total sales of electrical supplies aggregated about £1,000,000, the bulk of the imported products coming from America. The importation of all kinds of machinery into Japan increased by about £300,000 in 1912, the total imports in round numbers being £2,850,000. The principal business during 1912 consisted of the extension of the existing light, power, and railway stations. The Tokio Municipal Railway, for instance, purchased £60,000 worth of apparatus for transforming high-tension current in their various sub-stations throughout the city, to the trolley line voltage.

The machinery ordered about a year ago at Tokio for various large water-power electric companies has been arriving during the past few months and the plants are being completed. The principal ones are as follows:—

Tokio Electric Light Co.—An extension of about 40,000 KW. to their first water-power electric plant which amounted, when it was installed, to approximately 20,000 KW. This extension is now about finished.

The Kinugawa Hydro-electric Co.—Approximately 40,000 KW. This plant is now about completed and some current is already being transmitted to Tokio from its power stations.

Katsurugawa Hydro-electric Power Co.—This equipment complete was supplied from Schenectady, N.Y., the aggregate capacity being about 40,000 KW. All of the machinery has arrived and the work will probably be finished within the next few months, so that a large amount of power from that source will shortly be brought down to Tokio.

The Inawashiro Hydro-electric Power Co.—The order for this apparatus, amounting to about 40,000 KW., was placed about one-half with an English firm (Dick, Kerr & Co.), and the other half in America (Westinghouse). This apparatus had not been shipped at the time of writing, and the company will, therefore, not be ready for operation until after the end of this year.

At Yokohama a 3,000-KW. steam-turbine generator was installed to further increase the capacity of the existing lighting plant.

At Osaka there have been many additions to the existing electric railway plants, and some small suburban roads have been put into operation in the last four or five months. Osaka is a very active centre for the electrical business in Japan, and many suburban roads have been successfully put into operation there. On account of the large manufacturing interest developed, electric power will be largely used there in the future, and as there is a large water-power company, the Ujigawa, which is now nearing completion, and which will bring into Osaka 30,000 to 40,000 KW. of current, the prospects are favourable for low cost of light and power in that city in the future.

The Kyushin Electric Railway added during 1912 a 3,000-KW. turbo-generator set, and at Nagasaki two 500-KW. turbo-generator sets were installed as an extension to the existing lighting plant. The coal mines in Kyushin have also been active in purchasing electrical apparatus.

The greater part of the sales reported have been made through the General Electric Co., of America. In addition to the extensive business of selling American electrical machinery, the General Electric Co. is a leading factor in the electric lamp trade in Japan. It has developed a very large lamp manufacturing plant in Tokio, which now supplies the great bulk of the incandescent lamps used in the country. This plant is operated through a Japanese company under American control. It is managed entirely by Japanese, however, and the operatives are largely Japanese girls. It has been very successful both financially and in supplying the demands of the country. In fact, this is a new industry created in Japan within the last three or four years.

The General Electric Co. also owns a considerable interest in the Shibaura Engineering Works at Tokio, which is controlled by the financially powerful Mitsui Co. The Shibaura works manufacture electrical apparatus up to 2,000 KW., and the business for the past six months was so satisfactory that the company has decided to

increase its capital from the present £200,000 to £400,000 to take care of the demands of the market. There is close co-operation between this company and the parent General Electric Co., of Schenectady, N.Y., and "there is apparently no reason why this Japanese electrical manufacturing concern should not become very strong and prosperous." All of its products are manufactured in accordance with the American designs of the General Electric Co.

Large quantities of the smaller electrical supplies are imported into Japan, and in this business American manufacturers and importers participate very satisfactorily. It is evident, however, that the Japanese will be able, particularly through foreign associates, to manufacture the greater part of the smaller electrical supplies, including telephones and telephone equipment. The manufacture of this class of smaller electrical products in Japan is growing steadily and rapidly.

There are in Japan several British manufacturers who have a fairly large electrical business, but the Allgemeine Co. and the Siemens Schuckert Co. are the two important competitors of the American manufacturers of heavy electrical machinery and supplies.

Persia.—The British Consul at Ispahan reports that a telephone service, first established in that town in 1910-11, now numbers nearly 100 subscribers, and wires have been carried as far as the villages of Sehdah (about 16 miles) and Najafabad (about 20 miles), west of the town.

NEW PATENTS APPLIED FOR, 1913.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. W. P. THOMPSON & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

10,500. "Electric soldering irons." A. H. RAILING and A. J. D. KRAUSE. May 5th.

10,512. "Electrolytic electricity meters." SCHOTT & GEN. (Addition to 14,288 of 1909. Convention date, June 10th, 1912, Germany.) May 5th. (Complete.)

10,514. "Reversing and controlling gear for electric motors, specially applicable to electric motors for operating lifts." ETCHELLS, CONGDEN AND MUIR, LTD., and F. MUIR. May 5th. (Complete.)

10,519. "Electric motors applicable for driving kinetographs." I. KITSEE. (Divided application on 14,480 of June 26th, 1912.) May 5th. (Complete.)

10,535. "Electric motors." M. J. RAILING and J. COLE. May 5th.

10,539. "Means for automatically regulating the admission of air to electrical machines." G. A. MOWER, K. O. HALE and J. CHRISTIE. May 5th.

10,556. "Telephone fixtures." W. C. UDE. (Convention date, May 3rd, 1912, United States.) May 5th. (Complete.)

10,559. "Timing devices for operating electric switches and other apparatus." S. CHIGER. May 5th. (Complete.)

10,579. "Electrically-heated apparatus." E. C. R. MARKS. (Landers, Frary & Clark, United States.) May 5th. (Complete.)

10,608. "Windings of dynamo-electric machines and other electrical apparatus." ALLGEMEINE ELEKTRICITÄTS GES. (Convention date, May 3rd, 1912, Germany.) May 5th. (Complete.)

10,609. "Device for the automatic maintenance of phase equality of the currents of parallel-connected alternating-current machines." ALLGEMEINE ELEKTRICITÄTS GES. (Convention date, May 3rd, 1912, Germany.) May 5th. (Complete.)

10,616. "Electric light lamp stands and pendants fitted with copper silver-plated shades." A. H. B. SHARPE and G. BOOLE. May 6th.

10,631. "Time element or retarding devices for automatic circuit-breakers and the like." W. BURTON. May 6th.

10,685. "Circuit arrangements for telephone systems." SIEMENS & HALSKE AKT.-GES. (Convention date, May 6th, 1912, Germany.) May 6th. (Complete.)

10,717. "Switch-operating mechanism and the like for causing the actuation of signals on moving objects." E. J. PAGE and O. E. KELLUM. May 6th. (Complete.)

10,732. "Means for, and methods of, changing the frequency of alternating electric currents." A. M. TAYLOR. May 7th. (Addition to 8,858/11.)

10,770. "Rheostats for starting and controlling electric motors driving the blowing apparatus of organs or the like musical instruments." L. B. COUSANS. May 7th.

10,803. "Electric railway signalling systems." J. B. MOUYEN. (Convention date, May 8th, 1912, France.) May 7th. (Complete.)

10,840. "Electric accumulators, means of protecting against excessive discharge," D. ECCLES. May 8th.

10,841. "Method of operating rotary converters and other alternating-current machinery." A. H. RAILING and C. C. GARRARD. May 8th.

10,863. "Electro-deposition of alloys." S. O. COWPER-COLES. May 8th.

10,864. "Telephone exchange system." M. L. JOHNSON. May 8th. (Complete.)

10,873. "Apparatus for electro-osmotic extraction of water from substances." GES. FUR ELEKTRO-OSMOSE M.B.H. and GRAF BOTHO SCHWERIN. (Addition to 23,545, 1912.) May 8th.

10,892. "Means for improving the illuminating effect of electric and gas lamps." W. J. BEVILLE. May 8th.

10,900. "Automatic electric alarm signals and the like." P. DUNNE. May 8th. (Complete.)

10,901. "Arrangement for the regulation of machines for multiple wire-drawing and the like." SOC. ANON. DES FORGES ET ACIERIES DE HUTA BANKOWA. (Convention date, May 11th, 1912, France.) May 8th. (Complete.)

10,917. "Incandescent electric lamps." BRITISH THOMSON-HOUSTON CO., LTD. (General Electric Co., United States.) May 8th. (Complete.)

10,918. "Incandescent electric lamps." BRITISH THOMSON-HOUSTON CO., LTD. (General Electric Co., United States.) May 8th. (Complete.)

10,919. "Windings for dynamo-electric machines." BRITISH THOMSON-HOUSTON CO., LTD., and H. W. TAYLOR. May 8th. (Complete.)

10,920. "Systems for supplying from high-pressure mains continuous current at a lower pressure." E. A. GRAHAM and W. J. RICKETTS. May 8th. (Complete.)

10,977. "Device for recording telephone calls and the like." P. H. JONES. May 9th.

10,987. "Device for dealing with electrical currents in the earth." E. RYAN and H. W. BROWN. May 9th.

11,007. "Fly-wheel storage arrangements such as used in the electrical driving of hauling or winding machinery." SIEMENS-SCHUCKERTWERKE G.M.B.H. (Convention date, May 10th, 1912, Germany.) May 9th. (Complete.)

11,013. "Electric current-distributing systems." P. V. HUNTER, J. R. BEARD, and ELECTRICAL IMPROVEMENTS, LTD. May 9th.

11,017. "Treatment of metals or alloys to render them ductile and malleable." WESTINGHOUSE METALLFADEN GLUHLAMPENFABRIK G.m.b.H. (Addition to 19,869, 1912. Convention date, May 13th, 1912, Austria.) May 9th. (Complete.)

11,038. "Telegraph, telephone and like cables." A. J. STUBBS. May 10th

11,057. "Electrical time-switches." H. F. J. THOMPSON and J. H. BOWDEN. May 10th.

11,069. "Means for operating direction switches and resistance in electro-motor-driven controllers." ELECTROMOTOR EQUIPMENT CO., LTD, and A. J. BARLOW. May 10th. (Complete.)

11,090. "Meter-testing apparatus." R. L. DEZENDORF. May 10th.

11,106. "Wireless telegraphy." MARCONI'S WIRELESS TELEGRAPH CO., LTD., and C. P. RYAN. May 10th.

11,115. "Means for controlling electric circuits." H. LEITNER. May 10th.

11,128. "Anodes for the electrolysis of aqueous solutions." P. C. C. ISHERWOOD. May 10th.

11,131. "Electric relays." A. N. HOOLAND. May 10th. (Complete.)

11,135. "Apparatus for automatically starting and braking electromotors." H. DELVENNE. May 10th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1911.

ADVERTISING DEVICES AND THE LIKE. H. K. Harris. 27,793. February 10th, 1912. (February 10th, 1912. Patent of Addition not granted.)

1912.

SYSTEMS FOR STARTING ENGINES. C. F. Kettering. 1,424. January 18th. (June 19th, 1911.)

ELECTRIC TIME SWITCHES. F. T. Reid. 1,693. January 22nd. (August 22nd, 1912.)

DEVICE FOR DISINFECTING TELEPHONE MOUTHPIECES AND OTHER SIMILAR INSTRUMENTS. S. B. Dewhurst. 9,338. April 20th.

SYSTEM OF ELECTRIC GENERATION AND TRANSMISSION FOR MOTOR-DRIVEN VEHICLES, LOCOMOTIVES OR TRAINS. H. Leitner. 9,416. April 20th.

MEANS FOR REGULATING THE TEMPERATURE OF ELECTRICAL HEATING AND COOKING APPARATUS. J. C. P. Kirkwood. 9,513. April 22nd.

ELECTRIC CEILING ROSES AND THE LIKE OUTLET BOXES. S. Trood and J. H. Dale. 9,910. April 26th.

FIRE-ALARM SYSTEMS. G. Porter and H. Isaacs. 10,278. April 30th.

ELECTRICAL SWITCHES. A. Wynne. 13,455. June 8th.

STARTING SWITCHES FOR ELECTRIC MOTORS. J. M. S. Fontecha. 13,781. June 12th.

ELECTRODES FOR ARC LAMPS. A. Blondel. 14,741. June 24th.

MEANS FOR STARTING INTERNAL-COMBUSTION ENGINES. J. Y. Johnson. (F.I.A.T., Fabbrica Italiana Automobili Torino.) 15,069. June 27th.

METHOD OF MOISTURE-PROOFING CORD CONDUCTORS. Western Electric Co. (Western Electric Co.) 16,152. July 10th.

TYPE-PRINTING TELEGRAPHS AND CIRCUIT-SELECTING APPARATUS. H. O. A. Jensen. 18,985. August 19th.

ELECTRIC FUSES. G. W. Christians. 19,533. August 26th. (December 27th, 1911.)

SUPPLY OF FILTERED AIR TO DYNAMO-ELECTRIC MACHINES. G. A. Mower and K. O. Hale. 19,792. August 29th.

ELECTRICALLY-OPERATED SUCTION CLEANERS FOR THE EXTRACTION OF DUST AND THE LIKE. Armorduct Manufacturing Co., W. C. Jeary and J. P. Annacker. 20,269. September 5th.

PROTECTIVE DEVICES FOR ELECTRIC CIRCUITS. British Thomson-Houston Co., Ltd. (General Electric Co.) 20,663. September 10th. (Divided application on No. 16,708 of 1912, July 17th.)

COMMUTATORS FOR ELECTRIC MOTORS. W. H. Scott. 20,828. September 12th.

CONTROLLING APPARATUS FOR TELEPHONE SYSTEMS USING AUTOMATIC SELECTOR SWITCHES. E. C. Molina. 21,008. September 14th. (September 14th, 1911.)

BRUSH ROCKING APPARATUS FOR DYNAMO-ELECTRIC MACHINES. Pintsch's Electric Manufacturing Co., Ltd., and C. H. Vidal. 21,433. September 20th.

IGNITION SYSTEMS FOR MOTOR VEHICLES. A. L. Riker. 22,197. September 30th. (September 30th, 1911.)

DEVICES FOR AUTOMATICALLY ADJUSTING THE TIME OF IGNITION IN INTERNAL-COMBUSTION ENGINES. Firm of Robert Bosch. 24,665. October 28th. (December 6th, 1911.)

ELECTRIC HEATING OF HOUSES. H. Löfquist. 25,104. November 1st.

METAL FILAMENTS FOR ELECTRIC INCANDESCENT LAMPS. Westinghouse Metallfaden Glühlampenfabrik Ges. 26,269. November 15th. (November 20th, 1911.)

JOINT BOXES FOR ELECTRICAL CABLES. W. T. Henley's Telegraph Works Co. and W. H. Nichols. 28,094. December 5th.

ELECTRIC ARC LIGHTS. General Composing Co. Ges. 28,503. December 10th. (December 11th, 1911.)

1913.

MANUFACTURE OF QUARTZ ARTICLES. British Thomson-Houston Co. (General Electric Co.) 415. January 6th.

APPARATUS FOR PRODUCING PERFORATED STRIP FOR TELEGRAPHICALLY TRANSMITTING SIGNALS. Siemens Bros. & Co. (Siemens & Halske Akt.-Ges.) 942. January 13th. (Addition to No. 8,018 of 1908.)

MEANS FOR THE CONTROL OF ELECTRIC PRESSURE AND CURRENT REGULATORS. W. J. Poole. 1,765. January 22nd.